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Contributions to the Queensland Flora

F. M. Bailey, F. L. S.
Colonial Botanist

Being Botany Bulletins No. I - XVIII,
a subseries of the Bulletin of the
Department of Agriculture, Brisbane

1890 - 1916

No. XIII in part by Joseph Lauterer
No. XVIII co-authored by C. T. White

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DEPARTMENT OF AGRICULTURE, BRISBANE.

BULLETIN No. 4.

OCTOBER, 1890.

[Botany Bulletin No. I]

BOTANY:

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

BY AUTHORITY: JAMES C. BEAL, GOVERNMENT PRINTER, WILLIAM STREET.

1890.

TO THE UNDER SECRETARY FOR AGRICULTURE.

SIR,

The Paper herewith, setting forth descriptions of additions to our Queensland Flora, is submitted with the view that, being published in Bulletins similar to other matter issued from this Department, it may be within the reach of all who are interested in botany. It is my intention in future to give, as opportunity offers through the medium of these Bulletins, full descriptions of all additions to our Flora that may come under my notice. I would remind persons living in our remote districts that they can greatly assist the work by forwarding, as opportunity may occur, specimens of the plants of their locality.

I have, &c.,

F. M. BAILEY,

Colonial Botanist.

Department of Agriculture, Brisbane, Queensland.

October, 1890.

BOTANY:

CONTRIBUTIONS TO QUEENSLAND FLORA.

Order RUTACEÆ.

ZIERIA, Sm.

Z. aspalathoides, *A. Cunn.*, Fl. Austr. i. 305. (Name from supposed resemblance to some species of *Aspalathus.*) A heath-like shrub, the branches terete and pubescent, but usually with a decurrent glabrous line. Leaflets 3, sessile, or with the common petiole so exceedingly short that they appear verticillate, lanceolate or linear, rarely above 3 lines long, or when luxuriant 4 or 5 lines, the margins revolute, glabrous or slightly pubescent. Cymes usually 3-flowered, rather longer than the leaves. Calyx-lobes broad, obtuse or acute. Petals about 2 or 3 times as long. Anthers tipped with a small obtuse appendage.—*Benth., l.c.*

Hab.: Near Mt. Playfair, *F. v. M.* in Vict. Nat., Sept. 1890.

Order MELIACEÆ.

OWENIA, F. v. M.

O. vernicosa, *F. v. M.*, Fragm. iii. 15; Fl. Austr. i. 385. A tree of medium size, glabrous. Branches thick, marked with the broad scars of the fallen leaves, the young shoots glutinous. Leaves of 15 to nearly 30, lanceolate, acuminate, leaflets of about 2 in. in length, oblique, the midrib and transverse reticulations prominent, petiole flattened slightly. Panicles 3 or 4 in. long, with divaricate branches and numerous small flowers. Sepals about ½-line long, slightly ciliate. Petals little more than 1 line. Staminal tube short, with 10 subulate teeth. Fruit globose, glabrous, 1½ in. diameter, the stony endocarp thick and hard, usually 3-celled.—Fl. Austr. i. 385, in part.

Hab.: Near the Musgrave Telegraph Station, Cape York Peninsula, *T. Barclay-Millar.*

Order LEGUMINOSÆ.

CASSIA, Linn.

Section CHAMÆSENNA.

C. notabilis, *F. v. M.*, Fragm. iii. 28; Fl. Austr. ii. 284; Fragm. x. 9. Shrub of about 6 ft., clothed with long silky white hairs. Leaflets 9 to 15 pairs, ovate-lanceolate or oval-oblong, acute or the lower ones obtuse and mucronate, sessile, very obliquely rounded or truncate at the base, 1 to 1½ in. long; glands very small and acute between the leaflets of most of the pairs. Stipules narrow and

deciduous. Racemes on elongated peduncles in the upper axils. Bracts lanceolate, acuminate, very deciduous. Pedicels short. Sepals villous, about 3 lines long. Petals shortly exceeding the calyx. Perfect anthers 7, on very short filaments, of which 2 larger than the others; 3 small imperfect stamens. Pod oblong, very flat, thin and glossy, about $1\frac{1}{3}$ in. long, $\frac{1}{2}$-in. wide.

Hab.: Sand ridges of the Georgina River, *E. J. Whelan.*

Section PSILORHEGMA.

C. oligophylla, *F. v. M.*, Fragm. iii. 49; Fl. Austr. ii. 289. A tall shrub, glabrous or minutely pubescent. Leaflets 2 or rarely only 1 pair, broadly obovate, very obtuse, $\frac{3}{4}$ to 1 in. long, coriaceous; glands depressed and rather large between those of each pair. Flowers in short dense racemes, on axillary peduncles, rather numerous. Bracts oblong or lanceolate. Sepals obtuse, pubescent, about 3 lines long. Petals not twice as long. Anthers 2 or 3, lower ones rather longer than the others. Pod 2 to $2\frac{1}{2}$ in. long, nearly $\frac{3}{4}$-in. broad, very obtuse. —*Benth.*, Fl. Austr., l.c.

Hab.: Gulf country, *Dr. Thos. L. Bancroft;* Georgina River, *E. J. Whelan.*

ACACIA, Willd.

A. amæna, *Wendl.*, Comm. Acac. 10, t. 4; Fl. Austr. ii. 366. A tall or dwarf shrub, quite glabrous or the young growth pubescent. Phyllodia obliquely lanceolate or oblanceolate, straight or falcate, obtuse or with a small recurved point, much narrowed towards the base, not very thick, 1-nerved with nerve-like margins and more or less distinctly veined, with 1, 2, or 3 often prominent distant marginal glands, $1\frac{1}{2}$ to $2\frac{1}{2}$ in. long on the flowering shoots, longer on the barren branches. Racemes usually shorter than the phyllodia, with several small globular heads of about 8 to 12 flowers, mostly 5-merous. Sepals short, broad, usually separating when the flower is fully out. Petals 5, distinct, smooth, with prominent midribs. Pod flat, straight, or curved, with nerve-like margins, several inches long, 3 to 4 lines broad, not contracted between the seeds. Seeds ovate, longitudinal; funicle dilated and reticulate from near the base, very long, extending round the seed, returning on the same side and bent back a third time, encircling the seed in a triple fold, and thickened at the end into a fleshy aril, two-thirds the length of the seed.—*Benth.*, Fl. Austr., l.c.

Hab.: Glasshouse Mountains, *J. F. Bailey*, 1879.

Order SAXIFRAGEÆ.

POLYOSMA, Blume.

P. rigidiuscula, *F. v. M. et Bail.* (So named from the somewhat rigid texture of the leaves.) A straggling shrub, the leaves so far as known (only two small specimens obtained) 2 to 3 in. long, broad-lanceolate to ovate, the margins minutely and distantly denticulated with callous often pointed teeth or almost entire, usually acuminate, soon glabrous, rather conspicuously reticular-venulated, shining above, paler green beneath. Racemes spike-like, shorter than the leaves. (Flowers not seen.) Fruits ovate-ellipsoid, about 4 lines long, slightly hairy and nearly sessile. Seed turgid-ovate, its testule

smooth, membranous, brownish-grey, fresh albumen carnulent, embryo inconspicuous.

Hab.: Summit of Mt. Bartle Frere, *Bellenden-Ker Expedition*, August, 1889.

From this species differs *P. Cunninghami* already in leaves of thinner texture, lesser acumination, deeper indentation, and less prominent venulation, also in more turgid, streaked, and distinctly pedicellate fruits.

P. alangiacea has long-stalked leaves without any noticeable denticulation.

Among extra Australian congeners *P. ilicifolia* is one of the nearest, but in that species the petioles and pedicels are well developed, while the leaves are more denticulated and of thinner texture; nevertheless the latter characteristic may not hold good should the plant occur in cooler, more exposed, and less shady situations.

P. serrulata is still nearer to our present plant, differing in not almost sessile leaves and fruits, and perhaps also in its flowers; the fruits are also of less width.

P. helicioides, from New Guinea, is closely allied. In this, however, the leaves have the venules still more prominent and are less acuminated; but in the absence of fruit, and while of the third Australian species the flowers remain unknown, the contrasting cannot be carried further at present.

Order CRASSULACEÆ.

TILLÆA, Linn.

T. purpurata, *Hook. f.* in Hook. Lond. Journ. vi. 4721, and Tasm. Fl. i. 145; Pl. of Vict., *F. v. M.*, ii. t. 19; Fl. Austr. ii. 451. A very slender decumbent annual, of intricate growth, attaining 2 to 4 in. in height. Leaves linear, connate at the base, 1 to 2 lines long. Flowers minute, on slender solitary pedicels, mostly longer than the leaves, rarely short. Petals about ½-line long; sepals shorter, acute or obtuse. Carpels obtuse, not longer than the sepals, with several seeds.

Hab.: Yandilla, *F. Strüver*.

Order RUBIACEÆ.

GARDENIA, Linn.

G. megasperma, *F. v. M.*, Fragm. i. 54; Fl. Austr. iii. 409. A shrub, with thick branches, the young shoots and buds hoary-pubescent, the older leaves glabrous or nearly so. Leaves petiolate or nearly sessile, broadly ovate or almost orbicular, very obtuse, rounded or cordate at the base, coriaceous, marked, as in some other species, with ciliate pits in the axils of the primary veins, but these may not be constant. Flowers terminal, solitary, nearly sessile, pubescent. Calyx-limb ribbed, 4 to 6 lines long, divided to about the middle into linear obtuse lobes, occasionally cohering; corolla-tube ¾-in. long, slightly dilated upwards; lobes 4 to 7, oblong, rather shorter than the tube. Fruit ovoid-oblong, nearly 2 in. long, crowned by the base of the calyx-limb.—*Benth., l.c.*

Hab.: Cape York Peninsula, *T. Barclay-Millar*. These specimens show foliage and nearly matured fruit of a *Gardenia*, which I think only a form of the above. The fruits show but 3 placentas, are oval, and about 1¼ in. long.

Order STYLIDIEÆ.

STYLIDIUM, Swartz.

S. leptorrhizum, *F. v. M.*, Fragm. i. 148; Fl. Austr. iv. 16. An annual, the slender stem from 1 to 3 in. long, bearing a few leaves below the terminal tuft or rosette, quite glabrous or sprinkled with a

few short glandular hairs. Leaves rosulate, from oblanceolate to obovate or spathulate, obtuse or mucronate-acute, thin and membranous, often almost glaucous, ½ to 1 or rarely 2 in. long, including the petiole. Scape slender, leafless, except the minute bracts, from 2 or 3 in. to 1½ ft. long, glabrous or glandular hairy. Flower small, in a slender very loosely branched panicle or raceme along its branches, with or without one in the fork, all on rather long slender pedicels without bracteoles. Calyx-lobes free, narrow, and small. Corolla-lobes unequal (the 2 uppermost more united?), the labellum with 2 appendages, but none to the throat, or the appendages to the throat and not to the labellum. Capsule oblong-clavate, 2 lines long.—Fl. Austr., l.c.

Hab.: Charters Towers, *C. F. Plant.*

Order LABIATÆ.

HEMIGENIA, R. Br.

Calyx 2-lipped or 5-toothed. Corolla with a dilated throat: the upper lip erect, more or less concave, emarginate or 2-lobed; the lower lip longer, spreading, 3-lobed; the middle lobe usually larger and often 2-lobed. Stamens 4, in pairs; anthers 1-celled, the connective elongated, produced beyond the insertion into an appendage or sterile branch, which in the upper pair is usually short, dilated, and bearded or crested at the end with short hairs; in the lower pair, or rarely in both pairs, glabrous and attenuate or bearing an imperfect cell at the end. Style shortly bifid at the end. Nuts reticulate-rugose, attached to the middle or higher up. Seeds albuminous. Shrubs or undershrubs. Leaves opposite or in whorls of 3, entire, obtuse or rarely acute, and never pungent-pointed. Flowers all axillary, solitary or rarely clustered, with a pair of bracts under the calyx. Corolla hairy inside at the insertion of the stamens, and usually at the base of the lower lip.—Fl. Austr. v. 101.

Section DIPLANTHERA.

Calyx-teeth 5, nearly equal, subulate-acuminate or acute. Lower end of the connective of the lower anthers bearing an imperfect cell at the end. Leaves sessile, mostly opposite.

H. Biddulphiana, *F. v. M.*, Vict. Nat. Sept. 1890. (After Miss H. S. Biddulph, who sent specimens of the plant to Baron Mueller.) A rather dwarf plant, almost glabrous except the flowers. Leaves faintly dotted, 1½ to 2 in. long, mostly lanceolate, flat or the margins slightly recurved, opposite or ternate, on very short petioles. Flowers axillary, solitary or in pairs, on very short pedicels, bearing at the base very short linear acute bracteoles. Calyx 3 to 4 lines long, glandularly hairy, the lobes hardly half as long as the tube, almost equal, deltoid, and somewhat acuminate. Corolla probably white, nearly twice as long as the calyx, the outside bearing minute spreading hairs, the 2 upper lobes considerably shorter than the 3 lower ones, tube almost campanulate inside near the orifice, bearing crisp hairs. Anthers of the upper stamens 1-celled, augmented by a large somewhat membranous blunt appendage; anthers of the lower stamens 2-celled, one of the cells distant and diminutive. Pollen dark-purple.

Style glabrous, quite enclosed; stigmas extremely narrow. Nuts roughly reticulate, obliquely obovate, slightly compressed, about 1½ line long, brown.—From *Baron Mueller's* description in Vict. Nat.

Hab.: Near Mt. Playfair, *Miss H. S. Biddulph.*

Order FUNGI.

STRUMELLA, Sacc.

(This genus should be placed at the end of *Hyphomycetes*, not in *Pyrenomycetes* as given in 3rd Supplement to the Synopsis of Queensland Plants, p. 124.)

S. sacchari, *Cooke.*

Hab.: Brisbane, on decaying sugar-cane, *H. Tryon.*

PERONOSPORA, De Bary.

Of this naked-spored mould the Rev. M. J. Berkeley says—"The mycelium or hyphasma creeps amongst the loose tissue of living leaves and rapidly causes its destruction. From the mycelium erect threads are given off and make their way into the surrounding air through the stomates. These threads are mostly inarticulate, and more or less branched and often forked above, and have at their tips large generally ovate spores (conidia). Amongst the threads of the mycelium globose sacs (oospores) are produced, containing a single spore."

P. hyoscyami, *De Bary.*

Hab.: During the months of June and July last many samples of young tobacco plants were forwarded from various parts of the Colony to the Department of Agriculture, all suffering from this fungus. Dr. M. C. Cooke, the eminent English mycologist, who determines all my fungi, writes me that it is the first time he has seen this fungus on the tobacco plant.

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Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BULLETIN No. 7.

MARCH, 1891.

[Botany Bulletin No. II.]

BOTANY:

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

This is the second bulletin in the series later called "Botany Bulletin"

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

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BRISBANE:

BY AUTHORITY: JAMES C. BEAL, GOVERNMENT PRINTER, WILLIAM STREET.

1891.

NOTICE.

In issuing this second "Botany Bulletin," containing descriptions of additional Queensland plants, advantage is taken to remind correspondents and others of the large number of plants which are probably within a short distance of their homes, and common enough to them, yet many of which may be entirely new to science, or, as some that have lately reached my hands, but partially known. Only the other day a plant was sent to me for name, which until then was only known from a few flowering shoots collected by A. Cunningham about fifty years ago. Another correspondent forwarded specimens of a small tree only known previously from Dr. Robert Brown's specimens which were collected in the early part of the present century. Thus it will be seen that, although much has been accomplished towards making known the riches of the vast Australian flora, a very large number of our plants are as yet unknown or undescribed. In forwarding specimens of plants it would add greatly to their interest if the senders would record any properties they may be supposed to possess, or uses to which they may be put, either by the natives or settlers, as well as local or native names. Each specimen should bear a distinctive number, and a duplicate correspondingly numbered should be kept by the sender when the names are required to be returned. All parcels of this kind can be forwarded by packet post.

As these "Botany Bulletins" will mainly be devoted to the publication of the descriptions of new species and other matter appertaining to the flora of Queensland, the descriptions of any other new plants which from time to time may require publishing will follow after the Queensland matter.

March, 1891.

F. M. B.

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BOTANY:

CONTRIBUTIONS TO QUEENSLAND FLORA.

Order ANONACEÆ.

Tribe MITREPHOREÆ.

HAPLOSTICHANTHUS, F. v. M. in Vict. Nat. 1891.

Sepals 3, deltoid, early valvate; petals 6, uniseriate-valvate in bud, completely connate towards the base, thus forming a 6-lobed corolla, 3 of the lobes deltoid, 3 doubly as long and almost semi-elliptic, all remaining much connivent; torus depressed; stamens about 30, of pyramidate-cuneate, their connectives at the summit slightly convex or almost truncate and somewhat peltate, concealing the cells; ovularies 6, with sessile depressed stigmas; fruit unknown. Shrub with comparatively small chartaceous leaves, and with short-stalked, solitary, dark-coloured flowers of remarkable smallness.

This new Anonaceous genus seems best placed into the tribe of *Mitrephoreæ*, but it agrees with the otherwise very different *Hexalobus* in the downward conspicuously-connate petals. As regards the 6 petoline parts, placed in a single row, this plant seems to stand alone in the whole order, large as it is. The circumscription, however, of many of the genera needs revision also in this order, as much new material has been obtained during later years, affecting the generic limits as drawn formerly. The style and stigma offer good notes for primary distinctions also.—*F. v. M. l.c.*

H. Johnsoni, *F. v. M.*, Vict. Nat. 1891. Young branchlets thinly pubescent. Leaves almost sessile, rather narrowly lanceolar, acuminate, but at the base obliquely rounded, when young scantily beset with appressed hairlets, subsequently glabrescent, paler green beneath, from 1 to 3 in. long, $\frac{1}{3}$ to nearly 1 in. broad, thinly vemulated. Peduncles recurved, measuring at flowering time $\frac{1}{3}$-in. or less, occasionally supported at the base by a spinescently indurated bud. Sepals about $\frac{1}{16}$-in. long, pale-brown. Flowers as small as those of *Bocagea pisocarpa*, *Polyalthia moonii*, and *Popowia australis*, measuring, even when flattened out, only $\frac{1}{3}$-in. in diameter. Corolla outside beset with minute appressed hairlets, the connate portion quite as long as the 3 deltoid lobes, without any sutural indications; the 3 longer lobes somewhat triangular at the summit. Stamens only about $\frac{1}{24}$-in. long. Ovularies silky, during anthesis not emerging beyond the stamens.—*F. v. M. l.c.*

Hab.: Mount Bartle-Frere, *Stephen Johnson.*

Aspect: That of *Alphonsea zeylanica.*

Order MALVACEÆ.

Tribe HIBISCEÆ.

HIBISCUS, Linn.

H. Burtonii (n. sp.) (After R. C. Burton, to whom the writer is indebted for specimens of many rare plants from the little-known regions of Queensland.) A rather straggling small shrub, closely

clothed with short rigid stellate hairs, which are somewhat longer on the leaves. Lower leaves not collected, those of the flowering shoots preserved, narrow-lanceolate or linear-oblong, 1 to 1½ in. long, rounded at the base, on petioles of 2 to 5 lines; margins slightly crenate or deeply and irregularly toothed. Flowers small, solitary, on slender axillary pedicels of about ¾-in. long. Bracteoles 8 or 9, subulate, not over a line in length, covered with scabrous stellate hairs like the other parts of the plant. Calyx scarcely ½-in. long, very deeply divided into narrow-lanceolate lobes, the midrib and also a parallel vein or rib near each margin prominent, scabrous, with stellate hairs outside, glabrous on the inside. Corolla probably lilac, the petals but slightly exceeding the calyx-lobes, hairy on the back, with rather stiff mostly simple hairs. Staminal column about as long as the petals. Style-branches spreading; stigmas hispid, with white hairs. Capsule somewhat globose, not exceeding the calyx, more or less covered by short, bristle-like, usually simple hairs. Seeds bordered by silky laciniate scales.

Hab.: McKinley Ranges and Buckley River, *R. C. Burton.*

At first sight specimens of this plant reminds one of *Solanum discolor*, and it is probable that shoots of it may have been mixed with those of *H. microchlæna* and *H. Pinonianus*, both of which Baron Mueller at one time named *H. solanifolius*. *H. Burtonii* has much smaller flowers than either of the two species above named.

Order LINEÆ.

Tribe ERYTHROXYLEÆ.

ERYTHROXYLON, Linn.

E. ellipticum, *R. Br.; Benth.*, Fl. Austr. i. 284. A small tree with drooping branches. Bark rough, corky, becoming hard with age. Height about 35 ft.; diameter of trunk about 12 in.; timber very excellent, durable, resembling tulip-wood, but of closer grain (*T. B.-Millar*). Leaves obovate or ovate-elliptical, very obtuse, 1½ to 2½, on petioles 1 line; texture thin, the primary nerves not much more prominent or thicker than the finely reticulated veins. Stipules very deciduous, only seen on the buds, about 2 lines long, slightly hoary. Flowers in axillary clusters of 3 to 6, the pedicels 2 to 4 lines long (lengthening under the fruit) with minute, brown, scarious, broad bracts at their base, slightly enlarged and irregular under the flower. Calyx about 1 line long, divided nearly to the base into lanceolate acute lobes, the slightly imbricate margins of a light colour. Petals more than twice the length of the calyx, boat-shaped, very deciduous, the 2-lobed inner appendages very prominent and crumpled. Styles free, recurved. Drupe with a reddish sweetish pericarp, oblong, 3 or 4 lines long, 3-celled, two outer cells empty. Seed only in the middle cell of all the fruits opened.

Hab.: Near Electric Telegraph Station, Walsh Range, *T. Barclay-Millar.* Only previously known from Dr. Robt. Brown's specimens gathered on the mainland opposite Groote Eylandt.

Order RUTACEÆ.

Tribe ZANTHOXYLEÆ.

MELICOPE, Forst.

M. erythrococca, *Benth.*, Fl. Austr. i. 360. A lofty tree, with a smooth whitish bark. Leaves glabrous, at least on old trees, opposite,

subopposite, or alternate ; leaflets usually 3, oblong-lanceolate, obtuse, 1½ to 3 in. long, coriaceous, entire or obscurely crenulate, on a common petiole of ¾ to 1½ in. Panicles terminal or in the upper axils, loose, scarcely longer than the leaves. Sepals small, triangular, slightly ciliate. Petals 1½ lines long, slightly imbricate, valvate at the tips, minutely pubescent outside. Disk obscurely lobed. Filaments dilated and ciliate to above the middle. Ovary slightly hirsute, the carpels almost distinct. Styles inserted above the middle. Cocci 4 (or very rarely 5), very spreading, ovate, about 2 lines long, wrinkled, of a reddish colour.—*Mostly from Benth. l.c.*

Hab.: Wide Bay, *C. Moore* ; Moreton Bay and Brisbane River, *Hill* ; and *F. v. Mueller* in Flora Austr.

This tree has lately been met with in the white pine scrubs of the Bunya Mountains by Mr. H. Tryon, the Assistant Curator of the Queensland Museum, and from him we learn that it forms a lofty tree, and that the bark possesses a most peculiarly acrid pungency, promoting a great flow of saliva.

M. Broadbentiana (n. sp.) (After K. Broadbent, my companion when the plant was found.) A slender erect shrub, glabrous except the very young growth, branchlets 4-angular. Leaves in nearly equal pairs, sometimes one slightly shorter than the other; petiolules slender, 2 to 3½ in. long; terminal leaflet often 5½ in. long and 2½ in. broad, ovate-lanceolate, often long-acuminate, equal-sided to a petiolule nearly 1 in. long, lateral ones smaller, sessile or nearly so, and very unequal-sided, the lamina on the upper side terminating some distance above the base, all the leaflets very thin ; primary veins few, parallel, about 5 on each side of midrib with fainter intermediate one ; veinlets few. Panicle terminal, trichotomous, not more than half the length of the petiole. Flowers few, small; pedicels long as the flower; sepals 4, very obtuse. Petals 4, white, minutely dotted, ovate-oblong, under 2 lines long. Stamens 8—4 long, 4 short—the long ones alternating with the petals, the filaments thickened downwards, the lower half hairy. Disk broadly lobed. Ovary glabrous, 4-lobed. Styles glabrous, free at base, erect, inserted slightly below the apex at the internal angle of the carpels. Fruit not obtained.

Hab.: Palm Camp (4,000 feet altitude), Bellenden-Ker.

Order LEGUMINOSÆ.

Tribe TRIFOLIEÆ.

TRIFOLIUM, Linn.

T. procumbens, *Linn.* The Lesser Clover. A slender procumbent branching annual, more or less clothed with white appressed hairs. Leaves pinnately 3-foliolate, with obovate or obcordate leaflets, the central one often at a distance from the others. Flowers small, yellow, less than 20 in the small globular head, the persistent flowers concealing the small pod.—*T. minus*, Eng. Bot.

Hab.: This European annual, which has now become naturalised about most of the towns of Southern Queensland, has probably been introduced with lucerne seed. It, however, is not so unwelcome an addition to the pasture as the allied plant, the "Medic Burr," *Medicago denticulata*, Willd., whose burrs cause much loss to the sheep-farmer.

Order SAXIFRAGEÆ.

Tribe ESCALLONIEÆ.

QUINTINIA.

Q. Quatrefagesii, *F. v. M.*, Vict. Nat. 1891. Viscidulous; leaves from lanceolar to rhomboid-ovate, short-acuminate, with no perceptible denticulations, dark-green above, pale-brownish beneath, and there the costular primary venules prominent, the secondary venules on both pages concealed; racemes amply paniculate; flowers particularly small, on short pedicels; tube of the calyx angularly 5-lined; calyx-lobes deltoid, minute; petals deltoid-semielliptic, ciliolar-barellate inside at the base; stamens somewhat beset with hairlets, the filaments about half as long as the anthers; united styles 3-4, very short, but comparatively thick; disc expanded, slightly undulate, glabrous; stigmas hardly turgid; ovulary 3-4 celled.

Hab.: On the summit of Mt. Bartle-Frere, at an elevation of about 5,000 feet, *Stephen Johnson.*

This new species agrees with *Q. Sieberi* in its inflorescence, although the flowers are even smaller than those of *Q. Fawkneri*, while the leaves are more like those of *Q. Verdoni*, but singularly remarkable for their brownish tinge on the under side, where the dark costular but almost straight primary venulation becomes very conspicuous in the absence of secondary well-visible venules; as regards the proportionate length of the stigmas to the styles, our new plant differs from the four other known species. The leaves remind of those of some *Fagus:* they are broad in comparison to their length. Ripe fruit became not available for examination.

Since a long time it has been my wish to dedicate a memorable plant of the Australian flora to the venerable Professor Jean Louis Armand de Quatrefages, now an octogenarian, who since more than half-a-century advanced anthropologic and zoologic researches in a manner which had important bearing also on the autochthones as well as on the fauna of the lower invertebrata of these far southern colonies. The plant which now bears his celebrated name is restricted to the loftiest heights of intra-tropical Australia.—*F. v. M. l.c.*

Tribe CUNONIEÆ.

CERATOPETALUM, Sm.

(Name referring to the hard horn-like petals.)

Calyx-tube short, adnate to the base of the ovary; lobes 5, valvate, persistent and enlarged after flowering. Petals small and laciniate or none. Stamens 10, inserted on a perigynous disk; anthers small, the connective produced into a recurved appendage. Ovary short, half-inferior, 2-celled, with collateral ascending ovules in each cell, tapering into 2 more or less united styles, free and recurved at the top; stigmas terminal. Fruit small, hard, and indehiscent, surrounded by the 5 wing-like horizontaliy spreading enlarged calyx-lobes. Seed solitary, slightly curved; embryo green, curved, in the axis of a fleshy albumen. Trees or shrubs, glabrous or resinous. Leaves opposite, with 1 or 3 digitate leaflets articulate on the petiole. Stipules very small. Flowers small, in terminal trichotomous cymes or corymbose panicles.—*Benth.* in Fl. Austr. ii. 442.

C. Virchowii, *F. v. M.*, Vict. Nat. 1891. Leaves rather large, glabrous; stipules deltoid, early dropping, leaflets 3 or occasionally 2, on conspicuous stalklets, ovate-lanceolar, bluntly acuminated, devoid of conspicuous crenulations, thinly reticular-venulated; flowers in ample cymous panicles; calyx-tube as well as pedicels and peduncles

beset with spreading very short hairlets; calyx-lobes somewhat pale-reddish beneath, dark-purplish above; petals absent; apex of anthers extremely short; styles glabrous; summit of ovulary beset with minute hairlets; fruit 1-seeded; testule brown, glabrous; albumen copious; cotyledones foliaceous, dark-green, ovate-orbicular, flexuous, much longer than the radicle.

Hab.: On Mount Bartle-Frere, in the higher region, *Stephen Johnson.*

After the lapse of sixty years, since the second species became known, this third and evidently rare species has been discovered, the first (on which Sir James Smith established the genus) having become elucidated nearly one hundred years ago. Our present plant is easily distinguished from the two other congeners by the leaflets being only faintly crenulated, and in having stalklets from $\frac{1}{3}$ to 1 inch long, the articulation thus taking place at the junction of the stalklets with the leafstalk; moreover, the venular reticulation of the leaflets is less prominent than in either of the two other species. In some respects it stands between the two, it having normally trifoliate leaves like *C. gummiferum*, though of much larger size, while it is devoid of petals like *C. apetalum*; the nearest approach, however, is to the last mentioned congener. This is the first record of the genus as represented also in Queensland. Occasionally two seeds are matured in the fruits of *C. gummiferum*, and therefore likely also in the two other species and in *Schizomeria.*

This small tribute from the Australian floral world is gratulatorily offered to Professor Rudolph Virchow at the time of the public celebration of his 70th birth-day, so that his illustrious name may be identified for ever also with the living creation of this part of our planet, where his great pathologic teachings have not less contributed to the advancement of medical science than in other parts of the globe.—*F. v. M. l.c.*

Order MYRTACEÆ.

Tribe LEPTOSPERMEÆ.

LEPTOSPERMUM, Forst.

Section EULEPTOSPERMUM.

L. arachnoideum, *Sm.*, Trans. Linn. Soc. iii. 263; Fl. Austr. iii. 105. (It is probable that the name *arachnoideum* refers to the very great resemblance of the fruit to the body of a hairy spider.) A rigid intricately branched shrub 5 or 6 ft. high, branchlets more or less clothed with silky hairs. Leaves crowded, concave, linear, pungent-pointed, under $\frac{1}{2}$-in. long, hairy when young, prominently punctured by oil-dots. Flowers sessile, solitary, often terminating the short branchlets. Bracts light-brown, rather large, glabrous except the ciliate edge. Calyx broad, rather large, very silky. Petals rather larger than the calyx-lobes. Capsule shortly protruding from the calyx-tube, and easily separating from it, 5-celled.

Hab.: Stanthorpe, on swampy land.

Order LYTHRARIEÆ.

AMMANNIA, *Linn.*

A. Rotala, *F. v. M.*, Fragm. iii. 108; Fl. Austr. iii. 295. A slender annual, simple or slightly branched, often creeping at the base, and not above 3 in. high in some specimens, more erect and twice that height in others. Leaves in whorls of 3 to 6 or more, linear, 3 or 4 lines long. Flowers minute, nearly sessile, and solitary in the axils. Calyx smooth and membranous, about $\frac{1}{2}$-line diameter, with 5 or sometimes 4 or 3 acute teeth without accessory ones. Petals none or minute and fugacious, in the Indian ones nearly as long as the calyx-teeth. Stamens 3 (4 or 5?), inserted near the base of the calyx, and

not exceeding it. Ovary 1-celled or more or less divided into 3 by very thin evanescent partitions. Style short. Capsule 3-valved. *Rotala verticillaris*, Wight, Ic. t. 260.

Hab.: Bundaberg, *Jas. Keys*, Nov. 1890.

Order ARALIACEÆ.

Series PANACEÆ.

ASTROTRICHA, *DC.*

A. Biddulphiana, *F. v. M.*, Vict. Nat. Dec. 1890. (After Mrs. H. Biddulph.) A shrub of about 6 ft., branchlets terete, densely covered by a close light-brown stellate tomentum. Leaves somewhat crowded, narrow to broadish-linear, about 2 in. long, sometimes scarcely over a line broad, glabrous on the upper, tomentose like the branchlets on the under surface, the midrib alone showing; margins slightly recurved; apex obtuse or very slightly apiculate; petiole very short. Panicle 6 to 9 in. long, glabrous. Umbels not very numerous; peduncles very slender and rather long. Pedicels filiform, $\frac{1}{2}$ to $\frac{3}{4}$ in. long; involucral bracts very small, almost semi-lanceolate. Flowers purplish-black. Calyx-lobes minute deltoid; breadth of the petals quite half their length; anthers greyish. Ripe fruit nearly $\frac{1}{4}$-in. long, about ovate-ellipsoid, contracted at the commissure, otherwise turgid, terminated by the denticulated short calyx-limb, the two fruitlets spontaneously seceding, on tranverse section almost semi-cylindric, the commissural side broad and nearly flat, between which and the seed-bearing cavity through intrusion of the endocarp 2 accessory small tubular cells formed either hollow or filled with substance similar to the albumen, but perfectly closed, although placed close to the commissure. Seed concave-convex, the sudden prominence along the inner side as extensive as the width of the seed; albumen equable.—*F. v. M. l.c.*

Hab.: Near Mount Playfair, *Mrs. H. Biddulph.*

Order RUBIACEÆ.

Tribe GARDENIEÆ.

RANDIA, Linn.

R. tuberculosa (n. sp.) (Tuberculose-fruited *Randia.*) A slender erect shrub, from 5 to 10 ft. in height; branchlets somewhat 4-angular and the young growth strigillose. Leaves ovate-acuminate, 2 to 4 in. long, rounded at the base and there nearly $1\frac{1}{2}$ in. broad. Margins entire, primary veins distant, reticulations obscure; petioles very short, seldom exceeding 1 or 2 lines, texture thin. Stipules about 2 lines long, subulate from a broad base, very deciduous. Flowers on slender rigid peduncles inserted above the axils, bearing a single or few shortly pedicellate flowers arising from between a pair of minute triangular bracts, the peduncles lengthening out under the fruit, and often in the lower branches barren and forming spines. Calyx-tube slightly hairy, the free portion a membranous tube about 1 line long, bearing 5 minute teeth. Corolla, stamens, and style not seen. Fruit yellow, prominently verrucose, compressed and tapering towards each end, over 1 in. long, somewhat succulent, 2-celled. Seed compressed velvety-tomentose.

Hab.: Scrubs of Harvey's Creek, off Russell River, *Bellenden-Ker Expedition*, 1889.

Tribe PSYCHOTRIEÆ.

PSYCHOTRIA, Linn.

P. Simmondsiana (n. sp.) (After J. H. Simmonds, the enthusiastic hon. secretary of the Field Naturalists' section of the Royal Society of Queensland.) A spreading more or less hirsute shrub, rooting from the lower branches and extending to 20 or more feet, but the more erect branches seldom attaining more than 2 or 3 ft. in height; branches glandular-hirsute. Leaves ovate-lanceolate, 1 to nearly 2 in. long, tapering to a petiole of about 2 or 3 lines, primary veins distant, 4 or 5 pairs, glandular-punctate, especially on the underside; stipules connate and usually opening out on one side, soon scarious and deciduous, linear-lanceolate, 4 or 5 lines long, glandular-hirsute like the rest of the early foliage. Peduncles slender in the upper axils, 1½ to 2 in. long, bearing a head of few sessile white flowers, or divided into 2 or 3 very short branches, each branch bearing 3 sessile flowers. Calyx-teeth acute; corolla pubescent outside, the tube slightly longer than the lobes, lobes about 1 line long, slightly imbricate with inflexed tips. Stamens 5, about half as long as the corolla-lobes, inserted in a ring of short hairs at the mouth of the corolla-tube, the filaments shorter than the anthers. Style long as the flower, the stigmatic lobes not spreading.

Hab.: Tambourine Mountain and Mooloolah Scrubs, *Field Naturalists.*

Tribe GALIEÆ.

GALIUM, Linn.

G. Gaudichaudi, *DC.*, Prod. iv. 607; Fl. Austr. iii. 446. A very variable plant, usually hispid, more rarely glabrous except minute asperities. Stems usually numerous, short erect and densely tufted, or diffuse and extending to 1 or 2 ft. Leaves almost always 4 in a whorl, usually sessile, mostly lanceolate or linear, with recurved margins, 2 to 3 lines long, sometimes, and generally the lower ones, small and ovate, or thinner, ovate, and much narrowed at the base. Flowers white, very small, about 3 together, on axillary peduncles, which sometimes grow out irregularly into leafy branches, or the flowers and a few leaves clustered on a very short peduncle. Fruit quite glabrous and smooth when fully ripe, though often appearing rugose when shrivelled in dried specimens.—*Benth. l.c.*

Hab.: Mowbulan, Bunya Mountains, *H. Tryon*, Nov. 1890.

Order COMPOSITÆ.

Tribe HELIANTHOIDEÆ.

ZINNIA, Linn.

(After Joh. Gotter. Zinn, afterwards Prof. University Gottingen.)

Involucre of 3 or more rows of broad imbricate obtuse bracts. Head heterogamous, radiate; ray-florets female, with leathery ligule, persistent on the fruit. Receptacle conical, paleaceous. Disk-florets villous at the lobes. Style-branches with a conical hairy appendage. Achenes of the disk compressed, usually 1 or 2 awned, of the ray-florets subtrigonal. Herbs. Leaves opposite, entire; heads solitary, terminal.

Z. multiflora, *Linn.* An erect annual of 1 to 2 ft., somewhat hispid, inflated below head. Leaves oblong-lanceolate, with rounded subsessile base. Involucre campanulate, bracts compressed. Rays obovate, reddish-purple on the upper surface, pale beneath. Achenes of the disk with a single awn.

Hab.: This South American annual has now become naturalised in several parts of Queensland.

Order SOLANACEÆ.

Tribe SALPIGLOSSIDÆ.

DUBOISIA, R. Br.

D. Leichhardti, *F. v. M.*, Fragm. vi. 142; Fl. Austr. iv. 481, under the genus *Anthocercis*—since placed by Baron Mueller in *Duboisia*. A glabrous shrub or small tree, differing but little from *D. myoporoides*. Leaves oblong-lanceolate, rather obtuse, entire, narrowed into a petiole, quite flat, 2 to 4 in. long. Panicles terminal, somewhat leafy at the base, broadly pyramidal or corymbose. Bracts very small; pedicels short. Calyx small, broadly campanulate, with short broad teeth. Corolla-tube nearly 2 lines long, ovate-campanulate; lobes narrow, acuminate, rather longer than the tube. Anthers 1-celled. Fruit an oval black berry about 3 lines long, containing about 6 reniform granulated seeds about 1 line long.

Hab.: Baron Mueller writes me that he has received specimens of the above plant from Mrs. Biddulph, Mount Playfair.

Order ACANTHACEÆ.

Tribe THUNBERGIEÆ.

THUNBERGIA, Linn.

T. Powelli, *F. v. M.*, South. Sci. Rec. ii. 34. (After Walter Powell, who first collected specimens of the plant.) A herbaceous pubescent twiner. Leaves hastate on longish petioles. Flowers pure white, much exceeding the bracteoles; corolla-tube narrow. Calyx nearly glabrous, with short teeth. Anthers beardless, spurs very short, stigma undivided. Fruit nearly glabrous.—*F. v. M. l.c.*

Hab.: Goode Island, near Thursday Island, Torres Strait.

Order AMARANTACEÆ.

Tribe AMARANTEÆ.

TRICHINIUM, R. Br.

Series Rhodostachya.

T. Burtonii (n. sp.) (After R. C. Burton, the discoverer of the plant.) A perennial with a hard tufted stock. Stems sulcate, slightly hairy in decurrent lines from base of leaf, and more or less densely woolly-hairy near the inflorescence. Radical leaves about 1½ in. long including the rather long petiole, obovate or broadly spathulate, and prominently mucronate, the lamina decurrent on the petioles, expanding and stem-clasping at the base. Stem-leaves much smaller of somewhat similar form, nearly sessile, the apex pungently mucronate. Spike at first ovoid-conical, at length cylindrical, still with a conical

apex, attaining 3 or more inches in length, and a diameter of 1½ in. Bracts and bracteoles lanceolate, about one-third the length of perianth, scarious and more or less dark-coloured, both acutely acuminate, but the bracteoles not so dark and rather less than the bracts. Perianth ¾-in. long, the tube slightly turbinate, very short, hirsute with long hairs outside; segments narrow, rigid, with obtuse glabrous rosy tips about a line in length, the remainder plumose outside with long articulate hairs, the hairs of the margins near the base very long and flexuous, covering the inner surface, which, however, is glabrous. Filaments dilated at the base but not united above the perianth-tube in any of the flowers examined, 2 reduced to staminodia. Anthers rather large, oblong. Ovary shortly stipitate, glabrous except the top, which is woolly-hairy. Style excentrical, quite glabrous, pink towards the small brown stigma. Seed glossy.

Hab.: Towards Georgina River, *R. C. Burton.*

In many respects this new species approaches *T. exaltum*, again it reminds one of *T. Manglesii*, but is quite as distinct from either as they are from several closely allied species. In this and several other cases the plants of our flora require to be grown side by side so that their life history might be studied, and distinctive characteristics noted.

Order POLYGONACEÆ.

RUMEX, Linn.

R. bidens, *R. Br.*; Fl. Austr. v. 265. A perennial with a thick stem, rooting at the joints and creeping in the mud, throwing up numerous erect thick-flowering branches of 1 to 2 ft. Leaves lanceolate, the lower ones often 8 to 10 in. long, rather broad and obtuse, the upper ones narrow and more acute, passing into the small almost linear floral leaves. Flowers densely clustered, unisexual, but the two sexes mixed in the same clusters, the lower ones chiefly females, the upper ones chiefly or entirely males. Perianth-segments at the time of flowering almost petaloid and not very unequal. Inner segments of the fruiting perianth variable in size, usually 2 to 3 lines long, very broad, with 1 to 2 rigid teeth on each side near the base, the midrib more or less thickened into a tubercle.—*Benth. l.c.*

Hab.: Near Dalby, 1875. Overlooked in compiling the Synopsis of Queensland Flora in 1883.

Order LAURINEÆ.

Tribe PERSEACEÆ.

? CRYPTOCARYA, R. Br.

C. insignis (n. sp.) A tree of large size, the branchlets bluntly angular, and densely ferruginous-tomentose. Leaves ovate, obtuse, emarginate or shortly and bluntly acuminate, tapering at the base to a petiole of about 1 in., margins entire, upper surface glabrous, under surface more or less covered with ferruginous hairs, often very dense on the midrib, oil-dots numerous, but only visible under a strong lens, primary veins few and distant, alternate or nearly opposite, about 5 pairs, the cross veins almost parallel and prominent. Fruit a rich pink, glabrous, somewhat pear-shaped, about 2½ in. long, 2¼ in. diameter, inclosing a pendulous globose nut 1½ in. diameter, which

when ripe is free from the fleshy part or sarcocarp. In some respects this species approaches *C. Griffithiana*, Wight, differing from it in colour of fruit as well as in form of foliage.

Hab.: Tropical scrubs in the Cairns district, and thence to the Bellenden-Ker Range.

Of my specimens, I picked up the fruit under the trees, and the shoot of foliage was given to me by a settler as from the tree which bore the fruit.

C. Palmerstonii (n. sp.) Coohoy or Conkie nut. (After Christie Palmerston, who first sent fruit to Brisbane.) Tree of large size, girth at base 36 ft., tapering proportionally upwards as straight as an arrow for 80 or 100 ft. before branching; branches pithy.—*C. Palmerston.* Branchlets compressed or irregularly angular. Leaves alternate, oval-oblong, rounded or slightly tapering at the base; apex obtusely accuminate, 4 or 5 in. long and about 2 in. broad, upper surface glabrous and glossy, under clothed with a close light-coloured tomentum; primary veins about 8 pairs prominent, the smaller reticulations somewhat indistinct; petioles ½-in. or rather more long. Fruit about 2½ in. long and nearly as much in diameter, more or less prominently marked by irregular longitudinal corrugations, fleshy part of fruit becoming hard and brittle, enclosing a round free nut of more than 1 in. diameter, with a thin hard brittle shell, the interior filled by the large thick fleshy cotyledons, the oil or resin cells of which are very minute and only visible under a strong lens.

Hab.: Russell River. Leaves and fruit, *Bellenden-Ker Expedition.* Fruit, and notes on tree, *C. Palmerston*, who says that "the aborigines generally chew the kernel till they get sufficient dough to make a johnny-cake; toasting it on coals, it rises like self-raised flour. Probably its rising may be attributed to saliva; however, when crushed to meal it assumes a coffee colour; this damped and bound tightly in green fronds and cooked like a damper is very nice, and must be nutritious, for the aborigines whose favoured and principal diet it is are fat, agile fellows." Of these fruits Sergeant E. J. Whelan says that the natives steep them in running water before using them as food.

C. Bancroftii (n. sp.) (After Dr. Thos. L. Bancroft, who first sent fruit specimens to Brisbane.) A glabrous tree of medium size. Branchlets slender. Leaves alternate or at times nearly opposite, lanceolate, 4 or 5 in. long, 1 to 1½ in. broad in the centre, tapering towards a slender petiole scarcely over ¼-in. long, apex bluntly acuminate, penniveined with more or less conspicuous reticulations on both sides. Racemes terminal or in the upper axils about 4 in. long. Flowers not seen. Fruit about 2 in. long, with a diameter of 1½ in., on a thickened pedicel of about ½-in., rough, the apex pointed and tapering much at the base, the outer covering forming but a thin bark to the endocarp or shell of the nut, testa brown, the thick cotyledons which form the kernel white, not dark-brown as in *C. Palmerstoni*, the oil-cells very minute, and only visible under a strong lens.

Hab.: Johnstone River, *Dr. T. L. Bancroft*; other scrubs of Tropical Queensland, *Bellenden-Ker Expedition.*

The fruit of this tree is usually much more abundant than any of the other kinds, and probably the natives use it in a similar manner to *C. Palmerstoni.*

C. graveolens (n. sp.) Tree attaining 80 to 100 ft. in height and 1½ ft. diameter of stem, *T. L. Bancroft.* Branchlets smooth and angular. Leaves often opposite, oblong, somewhat coriaceous, 7 or 8 in. and 2½ to 3 in. broad, primary veins looping within the margin like those of a *Eugenia*, on petiole of ¼-in. Fruit red,

resembling a bergamot pear in shape, over 2 in. diameter, outer succulent part when fresh having a sharp acid flavour, inseparable from the endocarp, substance of the thick cotyledons thickly studded with large cells full of a bright-yellow resin having a strong disagreeable odour.

Hab.: Tringilburra Creek, *Bellenden-Ker Expedition*, 1889; Johnstone River, *Dr. T. L. Bancroft*.

Specimens of the above Lauraceous trees were obtained by members of the Bellenden-Ker expedition, and are placed provisionally in *Cryptocarya*, the material to hand not allowing a full diagnosis to be given. The specimens were mostly imperfect, and probably in some cases the foliage may not have been obtained from the tree bearing the fruit. The writer hopes that, this Bulletin coming into the hands of settlers in the district where the trees grow, they may be induced to forward to him fuller specimens by which a more accurate description can be given.

Order PROTEACEÆ.

Tribe PROTEEÆ.

PETROPHILA, R. Br.

Section PETROPHYLE.

P. Shirleyæ (n. sp) (After the wife of J. F. Shirley, B.Sc., F.L.S. &c., botanical lecturer to the Pharmaceutical Students, Brisbane.) A shrub of about 5 or 6 ft., branches with a much wrinkled or sulcate purplish-red bark, often glossy. Leaves pinnate with 2-3-chotomous pinnæ, the segments rather slender, terete and grooved above, and the points more or less pungent, the petioles nearly of equal length with the divided portion, whole leaf from 4 to 6½ in. long. Cones terminal, solitary or with 1 or 2 axillary ones close below it conical-oblong, 1½ to 3 in. long, ¾ to 1 in. diameter at the base; peduncles 1 to 1½ in. long, bearing 4 or 5 distant broad-acuminate bracts. Cone-scales much broader than long, more or less silky at length nearly glabrous, the elongated points deciduous above the base leaving an apiculate point to the scale. Perianth silky, yellowish, about 5 lines long; segments with glabrous points, falling off separately. Style-end continuous, fusiform, shortly hirsute. Nut slightly over 1 line broad, the apex or a little way down glabrous, the rest clothed with spreading silky white hairs.

Hab.: Moreton Island, *J. F. Shirley*, in flower and fruit; Fraser Island, *H. Tryon*, in fruit only.

This island species in many respects approaches both *P. pedunculata*, R. Br., and *P. pulchella*, R. Br. It differs from the first in the terminal inflorescence, silky perianth, more hirsute style-end, larger cones, and in the faces of the nuts being more covered by hairs, while from the latter its pedunculate cones are a sufficient distinction.

Order EUPHORBIACEÆ.

Tribe EUPHORBIEÆ.

E. peplus, *Linn.* An annual plant of 3 to 9 in. in height. Leaves below the flowering branches alternate, membranous, roundish, tapering into the petiole, very blunt, entire, smooth. Inflorescence dichotomous, the primary branches forming an umbel of about 3 rays, the floral leaves opposite without stipules; involucral glands crescent-shaped, without petal-like appendages. Capsule glabrous, smooth; seeds pitted.

Hab.: This European weed is now common in most bush-houses of South Queensland.

TRIBE CROTONEÆ.—SUBTRIBE ACALYPHEÆ.

MALLOTUS, Lour.

M. claoxyloides, var. angustifolia. A slender shrub, stems attaining 4 or 5 ft. but often flowering and fruiting when only 6 to 12 in. high. Leaves, except when very young, dark-green, appearing glabrous, the small stellate scales only visible under a lens, attaining 5 or 6 in. in length, with a breadth under 1½ in. tapering to an acute point and to the very short petiole, penniveined, the usual basal pair scarcely distinct from the others, the primary veins ending in sharp teeth on the margin of the leaf. Peduncle in the upper axils, slender, 2 to over 3 in. long, bearing clusters of small flowers.

Hab.: Yandina, *Field Naturalists*, March, 1891.

The marks of distinction between the above and other forms of this plant are found in its narrower leaves, their sharp serrated margins, the venation, its smaller growth, and the absence of the peculiar odour so common to the species.

Order URTICACEÆ.

TRIBE ARTOCARPEÆ.

FICUS, Linn.

F. Watkinsiana (n. sp.) (After Geo. Watkins, president of the Queensland Pharmaceutical Society, who for many years has been an ardent collector of Queensland plants.) A very large glabrous tree. with lofty trunk and smooth light-coloured bark, the base of stem flanging out, but not so prominently as in *F. macrophylla*. Leaves lanceolate, about 6 in. long and 2½ in. wide in the centre, texture coriaceous, the transverse parallel primary veins not very prominent, the intermediate ones very faint, all anastomosing and forming an intramarginal one some distance within the margin, much tapering towards a rather slender petiole of about 2 to 2½ in. Stipules about 3 in. long, narrow-acuminate. Receptacles in axillary pairs, oblong, 1½ in. long, 1 to 1¼ in. diameter, prominently umbonate, greenish with numerous small verrucose spots; peduncles nearly 1 in. long, very thick and often prominently angular, about ¾-in. long, verrucose like the receptacle, expanding at the top into a broad thick smooth edge, cartilaginous disk at the base of the receptacle. Male flowers seem to be confined to the top and umbonate portion of receptacle: bracts brown, acuminate from a rather broad base; stigma acute.

Hab.: Mooloolah, *Field Naturalists*, Dec. 1890; top of Bunya Mountains. *H. Tryon;* top of Blackall Range, *Alex. Anderson.*

This large handsome tree should be utilised for shade purposes, like *F. macrophylla*, which it somewhat resembles.

Order ORCHIDEÆ.

DENDROBIUM, Sw.

D. bigibbum, var. albo-marginatum. This form has light pink-coloured flowers, the sepals of which have a well-marked white border, the plates of labellum white.

D. bigibbum, var. venosum. This form is of an almost uniform dark-pink colour, but distinct from all by the very prominent venation.

The above two distinct forms are now flowering in the bush-house of Mr. J. A. Beal, a gentleman who of late has paid much attention to the cultivation of this family of plants. The plants with several others, many of which have not yet bloomed, were received from Cape York.

PTEROSTYLIS, R. Br.

P. reflexa, *R. Br.*, Prod.; Fl. Austr. iv. 359. Stems slender, 6 to 9 in. high, glabrous or minutely scabrous-pubescent or papillose, without any rosette of radical leaves at the time of flowering. Leaves or empty scales lanceolate, erect or slightly spreading, acuminate, under 1 in. long in the typical form, and none usually so long as the bract subtending the terminal pedicel, more leaf-like and longer in some varieties. Galea 1¼ to above 1½ in. long, curved but not abruptly so, the petals as well as the sepals tapering into fine points; lower lip cuneate at the base, the lobes lanceolate, separated by a sinus much narrower than in *P. grandiflora*, and almost acute, tapering into long filiform points embracing the galea. Labellum more or less lanceolate, and tapering towards the end into a long or short point; the basal appendage linear, curved, penicillate at the end. Column-wings with a small erect acute lobe at the front angle, the lower lobe oblong and obtuse.—*Benth. l.c.*

Hab.: Dalrymple Creek, Darling Downs, South Queensland, *C. H. Hartmann.*

Order LILIACEÆ.

Tribe UVULARIEÆ.

SCHELHAMMERA, R. Br.

S. pedunculata, *F. v. M.* in Vict. Nat. March, 1891. Baron Mueller (*l.c.*) says: Leaves 7 in. long and 2 in. broad, much acuminate, shortly petiolate, pellucid. A larger plant with the transverse secondary venules closer than in *S. multiflora*. Peduncles of umbels 1 to 1½ in., the fruit considerably larger than in the last-named species. The præfloresence of sepals and petals is the same as in *S. undulata* and *S. multiflora*.

Hab.: Mount Bartle Frere.—*Stephen Johnson.*

The above is all from Baron Mueller on the specimens collected by Mr. Johnson on Mount Bartle Frere, given in the March number of the Victorian Naturalist, 1891. Doubtless Baron Mueller at some future time will give a more detailed description.

Order JUNCACEÆ.

JUNCUS, Linn.

J. capillaceus, *Hook.*, Fl. Tasm. ii. 65, t. 134; Fl. Austr. vii. 132. Stems from a tufted or shortly creeping branching base erect, leafy, only 2 or 3 in. high. Leaves very narrow or subulate, nearly terete, or more or less distinctly divided inside by cross partitions of pith as in *J. prismatocarpus*, sometimes shorter than but often twice as long as the stem. Flowers in little clusters of 3 to 10, rarely reduced to single flowers, and often not above 3 or 4 clusters to the small panicle, the lowest bract usually elongated and leafy, the other bracts small. Perianth-segments about 1 line long, lanceolate with scarious margins, rather acute, but without the subulate points of *J. prismatocarpus*. Stamens 6. Capsule as long as or shortly exceeding the perianth, obtusely angular and shortly beaked. Placentas scarcely prominent. Seeds without tails.—*Benth. l.c.*

Hab.: Stanthorpe.

Order AROIDEÆ.

TYPHONIUM, Schott.

T. Millari (n. sp.) Rhizome attaining to 4 to 6 in., flattish and irregular in shape. Leaves glaucous, about 6 to a plant; petioles 6 to 10 in. long, finely striate, the broadish sheathing base occupying about 2 or 3 in., border of sheath tinged with purple; lamina divided nearly to the base into 3 narrow attenuated lobes, the middle one of the largest leaves about 9 in. long and 1¼ in. broad at the widest part, lateral lobes somewhat shorter, usually with an upward tendency, but sometimes horizontally spreading; midrib and veins prominent on the under surface, the veins few, distantly anastomosing. Flower inodorous, usually on a very short scape. Spatha with a glaucous, smooth, striated, ovoid, convolute base, of about 1¾ in.; lamina 8 to 12 in. long, very broad but tapering to an acuminate apex, bright-green with prominent distant anastomosing veins on the outside, the inside of a uniform dull-purple colour, when fully expanded turning an olive-green in the course of a day, almost campanulate, the long tapering upper part of the spatha being thrown back. Spadix terminated by a helmet-shaped, fleshy, smooth, copper-coloured appendage 1½ to nearly 2 in. long, the base obliquely truncate; immediately below this is a smooth velvety-brown terete neck of about 3 lines, the next ½-in. is occupied by the rosy male organs, after which is a bare interval of about 1 in. of a deep glossy purple, when fresh this is covered by papillæ, between this and the female portion is a ring of recurved filiform neutral organs, the base of the spadix for about ½-in. is occupied by the sessile ovaries. Stigma sessile. Berry speckled, 1-seeded.

Hab.: Walsh, *T. Barclay-Millar.*

T. Millari differs from *T. Brownii* in its prominently striated petioles, the sheathing bases being widely spread over; in the venation of the leaf-segments being very oblique and not half so numerous; in its much larger flowers, which are quite scentless.

Order CENTROLEPIDEÆ.

CENTROLEPIS, Labill.

C. fascicularis, *Labill.*, Pl. Nov. Holl. i. 7, t. 1; Fl. Austr. vii. 207. Leaves ¾ to 1½ in. long, usually ciliate below the middle with a few long hairs (nearly or quite glabrous in the Queensland specimens). Scapes slender, 1 to 3 in. high, glabrous or rarely sprinkled with a few short hairs. Floral bracts at a short distance from each other, ovate, hispid with long rigid hairs, 1½ to 2 lines long with glabrous awns about the length of the bract, or that of the lower bract longer. Flowers 4 to 8 in each bract, a hyaline scale under each stamen often as long as the bract and toothed at the end, and usually but not always a smaller scale under or by the side of each ovary. Carpels of the ovary 2 to 4, usually 3; styles nearly free.

Hab.: Stanthorpe.

Order CYPERACEÆ.

Tribe CARICEÆ.

CAREX, Linn.

C. constricta, *F. v. M.*, Fragm. viii. 258; Fl. Austr. vii. 442. Stems rather slender, somewhat scabrous, 6 to 24 in. long. Leaves

long and narrow, the floral leaves or bracts short and subulate, or the lowest long and leaf-like. Spikelets 3 to 6, all rather distant, erect and sessile, or the lowest shortly pedunculate, the terminal one male, slender, 1 to 2 in. long, the others usually shorter, female or rarely with a few male flowers at the top. Glumes narrow, obtuse or almost acute, thin brown or hyaline, with a green centre or midrib. Utricle much flattened, with nerve-like margins, ovate or elliptical, about 1½ lines long, shortly stipitate and contracted into a very short truncate or scarcely 2-toothed beak, with 3 or 4 prominent nerves on each face. Style-bracts 2. Nut flat, nearly orbicular, much shorter than the utricle.—*Benth. l.c.*

Hab.: Stanthorpe. This species should probably be better placed as a form of *C. vulgaris*, from the Queensland form of which it seems principally to differ in its pale-coloured glumes and scabrous stems.

Order GRAMINEÆ.

Tribe PANICEÆ.

PENNISETUM, Rich.

P. arnhemicum, *F. v. M.*, Fragm. viii. 109; Fl. Austr. vii. 496. Stems erect. Leaves narrow, rather rigid, glabrous and glaucous, the ligula very short, split into cilia. Spike rather dense, about 4 in. long, appearing woolly from the plumose bristles. Involucres almost sessile, of 6 to 10 unequal bristles, the longest about ½-in. long, all very densely woolly-plumose with long soft white hairs. Spikelets solitary, shortly pedicellate within the involucre, about 2 lines long, quite concealed in the wool. Outer glume about one-third the length of the spikelet, 2nd and 3rd glumes nearly equal, both empty and about 7-nerved. Fruiting glume shorter, hard, smooth, and shining. Style separate to the base or nearly so.—*Benth. l.c.*

Hab.: Fragmentary specimens of what seem to belong to the above grass were brought to me from the Gilbert River by the late Mr. F. J. C. Wildash, September, 1881.

Tribe MAYDEÆ.

CHIONACHNE, R. Br.

C. Sclerachne (n. sp.) Stems erect, slender, and leafy, from a knotty more or less woolly base, 1 ft. or more high. Leaves erect, the sheath clothed with rather long white silky hairs, and prominently nerved, ligula short-ciliate, lamina narrow tapering to a fine point, more or less hairy but the hairs very short. Inflorescence axillary, very short; on the specimens examined there were a few pedicels which probably bore male spikelets. Female spikelets nearly sessile; glumes hardened and smooth, outer 2 lines long, keeled and faintly nerved, obtuse, margins thin; 2nd glume thick, hard, almost enclosing the rest, and about ½-line longer than the others, and bearing a blunt point; 3rd glume thinner, striate, as long as the outer; 4th glume almost hyaline. Palea narrow. Grain free, dark-brown and about 1 line long.

Hab.: Lloyd Bay, Cape York Peninsula. The specimens from which the above diagnosis is given were received from T. A. Gulliver, April, 1886. It is but a poor-looking wiry grass, but horses are said to be fond of it.

Tribe FESTUCEÆ.

ERAGROSTIS, Beauv.

E. Rankingi (n. sp.) (After R. A. Ranking, who when police magistrate at Blackall paid some attention to collecting specimens of the native plants.) Stems tufted, slender, leafy, erect, 6 to 12 in. high, slightly knotted, and with a little woolly hairs at the base. Leaves spreading, narrow-lanceolate when growing, much convolute and appearing setaceous in drying, the lower ones and sometimes all clothed with longish hairs 1 to 2 in. long. Panicles 3 to 6 in. long, the branches divaricate, rather short. Spikelets pedicellate, scattered, dark-purplish, about 3 or 4 lines long and not ½-line broad, with 8 to 16 flowers. Glumes closely distichous, about ½-line long, obtuse or almost acute, very thin almost hyaline, purple with a slight mark down the centre, the edges light-coloured and ciliate. Palea very obtuse, long as the glume, edge ciliate. Stamens 3; anthers purple; grain ovoid, smooth, minute.

Hab.: In 1880 fragmentary specimens of this grass were sent to me by Mr. Ranking from Blackall, mixed with good specimens of *E. chætophylla*; and a few days ago while at Miles I secured excellent specimens which leave no doubt of its being a distinct species. It approaches *E. eriopoda* in its hairy leaves, but has not the bulbous base of that species. It also resembles *E. chætophylla*, but its leaves are never entirely glabrous, and the spikelets are not more than half the width of either of these species.

Order FILICES.

Tribe CYATHEÆ.

ALSOPHILA, R. Br.

A. australis, *R. Br.* Of this species there are at least four pretty well marked forms or varieties met with in Queensland, and it is to two of these I now particularly draw attention. They were received some three or four years ago from the Johnstone River, and are now showing sori for the first time in the bush-house at Bowen Park.

The four forms may be briefly distinguished thus:—

1. A. AUSTRALIS, normal form. Tall tree with slender trunk, the bases of old stipes more or less persistent on the upper portion, the crown stipes and rhachis densely clothed with long linear-lanceolate and setaceous scales of a brown colour; pinnules 2 or 3 in. long.

Hab.: The more southern parts of Queensland.

2. A. A. VAR. CERVICALIS, *Bail.* This forms a trunk of 6 or more feet high, rather slender, say about 4 in. diameter, and mostly retaining the bases of the stipes on the upper portion. Fronds 5 to 7 ft. long including a stipes of about 15 to 18 in. These bend inwards just above the crown of the trunk, and form a neck, giving one the impression that a string had been tied round the bases of the stipes at an early stage of their growth; crown of trunk and immediate base of stipes with the scales of the normal plant, but lighter coloured; stipes and rhachis slightly muricate, nearly white, and bearing few or no large scales; under surface of frond very light; pinnules of the normal form.

Hab.: Johnstone River. Trees growing in bush-house, Bowen Park.

3. A. A. EXCELSA (*A. excelsa*, R. Br.) A tall tree with stout trunk, the bases of the stipes either persistent or falling free away and

leaving a prominent scar; the crown of trunk and stipes densely clothed with the scales of the normal form. Fronds very large, pinnules twice the size of those of *A. australis*, and the segments more falcate and obtuse, the lowest often subauriculate.

Hab.: Common both South and North, plentiful about Maroochie.

4. A. A. PALLIDA, *Bail.* Trunk 6 to 8 ft. high, rather slender, the upper portion retaining the bases of the old stipes. Fronds 8 to 10 ft. long or probably more, including the stipes, which often measure 4 ft. These are slightly muricate, very pale-coloured, nearly white and scaly only at the immediate base, direction erecto-patent; pinnules of *A. excelsa*.

Hab.: Johnstone River. Trees growing in bush-house, Bowen Park.

Order MUSCI.

ARCHIDIUM, Bridel.

Perennial plants renewing themselves by growth from the apex or below, with branches and branchlets at first erect, finally prostrate, the primary stem scarcely lasting beyond a year. Leaves lanceolate or lanceolate-subulate, rarely ovate-lanceolate or broadly ovate-lanceolate, costate; areolation lax, cells uniform, hexagono-rhomboid. Flowers monœcious and hypogynous. Capsule sessile within an imperfect vaginule, globose, when ripe formed of but a single layer of cells, without sporangium (operculum). Spores arising from a single primordial cellule, few, very large, irregularly polyhedral. Calyptra imperfect, very thin, irregularly lacerate, adhering in fragments to the capsule.—*W. P. Schimper* in "Synopsis Muscorum Europæorum," vol. ii. p. 23.

A. brisbanicum, *Broth.* (n. sp.)

Hab.: On swampy land near Brisbane, *H. Tryon.*

HOLOMITRIUM, Bridel.

H. corticola, *Broth.* (n. sp.)

Hab.: Near Brisbane.

CERATODON, Bridel.

Short tufted diœcious mosses, growing on earth, burnt wood, &c. Foliage of *Trichostomum*. Fruit-stalk terminal, very slender. Capsule sub-erect, narrow-oblong, curved, thick-walled, furrowed, angular when dry. Teeth 16, lanceolate, split nearly to the base, joints prominent, distant in the upper part, close below, conniving when moist, spirally incurved when dry. Annulus double, revolute. Operculum conical, beaked. Calyptra cucullate.—*Hask.*, New Zeal. Flora, 422.

C. purpureus, *Bridel*, Fl. N. Z. Stems densely tufted, short, dichotomously branched. Leaves dull-green, spreading, oblong or lanceolate, veined, papillose on the back. Margins recurved, somewhat twisted when dry; nerve strong, excurrent. Perichætial larger sheathing, acuminate. Fruit-stalk purple. Capsule sub-erect, oblong, slightly incurved, striate, nearly horizontal when dry. Teeth combined at the base, 2-fid, edges pale. Operculum conical.—N. Z. Fl. l.c.

Hab.: Near southern border of Queensland, *J. F. Shirley*.

PHASCUM, Linn.

P. cylindricum, *Tayl.* (*Tetrapterum cylindricum*, Tayl.) A tufted yellowish-green moss, with divided stems, the branches simple. Leaves oblong, obtuse, apiculate, somewhat thick, with subinvolute margins. Capsule exserted, erect, cylindric-ovate, apiculate (operculum persistent), shortly pedicellate. Calyptra dimidiate, cucullate or conico-campanulate.

Hab.: Southern border of Queensland, *J. F. Shirley.*

WEISIA, Hedw.

W. (Hyophila) tenera, *Broth.* (n. sp.)

Hab.: Brisbane River, near St. Lucia Estate, and Petrie's Quarry, *H. Tryon.*

TORTULA, Hedw.

T. (Barbula) Wildii, *Broth.* (n. sp.) Paper No. 1, New Austr. Mosses, p. 9. Diœcious; cæspitose, in dense broad tufts, partly hidden below by the soil, above brown or olivaceous, usually about 1·4 cm. high. Stems erect, dichotomously branched, branches erect, fastigiate, lower part of stem sparingly furnished with long radicles. Leaves densely crowded, when dry appressed, when moist erecto-patent, carinate-concave, lanceolate, entire, apex rotundate, length of leaf 1·4 mm., breadth ·57 mm., from base almost to apex the margin is plainly revolute; nerve fuscescent, thick, ending below the apex; cellules strongly incrassate, basilar ones shortly rectangular, upper ones rotundate or rotundate-quadrate, ·0075-·008 mm. in diameter, papillose and chlorophyllose; perichætial bracts most intricately convolute, laxly areolate, with margin plane, archegonia numerous without paraphyses. Other parts unknown.

Hab.: Highfields, at an altitude of 1,500 ft. on calcareous earth, *C. J. Wild.*

MACROMITRIUM, Bridel.

M. platyphyllaceum, *C.M.* (n. sp.)

Hab.: On bark, Bunya Mountains, 1885.

PHYSCOMITRIUM, Bridel.

P. Tryoni, *Broth.* (n. sp.)

Hab.: River bank, Breakfast Creek, *H. Tryon.*

BRYUM, Linn.

B. pimpamæ, *C.M.* (n. sp.)

Hab.: Pimpama, *C. J. Wild.*

B. subolivaceum, *C.M.* (n. sp.)

Hab.: Petrie's Quarries, *H. Tryon.*

B. austro-argenteum, *Broth.* (n. sp.)

Hab.: Fertile specimens, *H. Tryon.* Very common about Brisbane, but rarely found in fruit.

B. viridissimum, *Broth.* (n. sp.)

Hab.: Brisbane, *H. Tryon.*

B. Tryoni, *Broth.* (n. sp.)

Hab.: South Brisbane, *H. Tryon.*

B. (Rhodobryum) pusillum, *Broth.*, Paper No. 1, New Austr. Mosses, p. 55. Diœcious; barely cæspitose, very small, green; stems to 6 mm. high, erect, flexuose, slender, the base provided with long simple brown radicles; leaves on lower parts of stem remote, minute, squamiform, hyaline, lanceolate, cuspidate, with a thick rufescent nerve, margin simple, limbate; upper leaves sparingly denticulate, densely crowded in the apex, bearing numerous frequently branched protonemata in the axils; when dry erect, not crisped or twisted or shining; when moist outspread, flat, sharply reflexed, not decurrent, from the base broadly spathulate oval, with the excurrent nerve shortly cuspidate, usually 2 mm. long, base ·6-·7 mm. wide, above 1·3 mm. wide, with margin revolute from base to middle, above that flat; apex indistinctly serrulate, limbate, border narrow, lutescent of cells in 2-3 series, nerve shining, lutescent, at the base rufescent, with apex shortly cuspidate, reflexed, slightly excurrent; basilar cellules oblong, sparingly chlorophyllose, upper ones oblong-hexagonal, in the middle of the leaf ·06 x ·017 mm., copiously chlorophyllose; perichætial bracts much smaller, lanceolate, cuspidate, with the excurrent nerve, margins revolute, above serrulate, indistinctly limbate; archegonia numerous, enclosing filiform paraphyses. Other parts unknown.

Hab.: Helidon, on the bark of trees, *C. J. Wild.*

PLAGIOBRYUM, Lindl.

P. Wildii, *Broth.*, Paper No. 1, New. Austr. Mosses, p. 13. Diœcious; compactly cæspitose, in very short tufts, not shining, rigid, when young with pallid green apex, finally olivaceous, very densely fusco-radiculose; stems very short, generally 2·5 mm. high; lower parts leafless, summit foliose, very variable, thick, not clavate, erect, straight, obtuse, densely foliose, very short or to 6 mm. high; leaves when dry appressed, when moist erect, carinate-concave, oblong, acute, 1·6-1·8 mm. long x ·8-·85 mm. wide, not decurrent, entire, with margin revolute, faintly limbate; nerve purple, thick at the base, more slender above, and finally vanishing below the apex, very laxly netted, basilar cells purpurascent, elongate, broad, upper cells rhomboid, marginal ones narrow, forming an indistinct border; fully developed leaves cochleariform-concave, oblong-oval, entire, margin flat, distinctly limbate, border cells in one series, nerve longer, thin, subexcurrent; perichætial bracts much smaller than the leaves, lanceolate, acute, entire; setæ to 1·7 cm. high, thin, erect, flexuose, pale-red, slightly shining, very smooth; thecæ inclinate, subgibbose-pyriform, with longish neck, theca and neck being 4 mm. long, of delicate texture, pallid, when dry shining, rugulose, not constricted below the mouth, ·95 mm. thick; ring simple, ·06 mm. thick; peristome double; exostome of lanceolate teeth, rather obtuse, densely trabeculate, base striate, golden, above yellow, not papillate; endostome perfectly free, basilar corona 0·2 mm. high, yellow, processes narrow, at the base ·015 mm. wide, with teeth of equal length or slightly longer, perforate, papillose, yellow, without cilia; spores ·017 mm., pallid, minutely papillose; operculum small, red, convexo-conical, very shortly apiculate, straight, very acute. Calyptra and male plant unknown.

Hab.: Highfields, *C. J. Wild.*

WILDIA (n. g.), *C.M. et Broth.*

Paper No. 1, New Austr. Mosses, p. 15.

Small pallid mosses with creeping stems, sparingly branched with short curved branches, and bearing densely imbricated, 4-ranked, asymmetrical leaves; perigonium triphyllate; perichætial bracts forming an imbricated cylinder; thecæ erect, cylindrical, with attenuate base, capsule not constricted below the mouth; peristome simple of 16 equidistant teeth; operculum conical with short straight beak; calyptra campanulate, sulcate, quadrifid. Separated from *Solmsiella*, C. Mull., by the characters of the peristome and calyptra.

W. Solmsiellacea, *C. Mull. et Broth.*, Paper No. 1, New Austr. Mosses, p. 15. Syn.: *Aulacopilum Wildii*, Broth. Monœcious; subcæspitose, soft, depressed, glaucous-green becoming pallescent; stems to 1·3 cm. long, with the leaves usually to 1·5 mm. wide, flaccid, creeping, through its whole length sparingly radiculose, radicles long, red, densely foliose from the base; sparingly branched, branches short, obtuse, curved, depressed; leaves densely imbricated, 4-ranked on the compressed stem, in front 2-ranked, when moist widespread, asymmetrical, narrow from base to insertion, superior margin arcuate, below almost straight, reflexed, oblong-orbicular, very obtuse, ·5-·6 mm. x ·3-·4 mm., minutely papillose, entire, subplane, without midrib; cellules lax, chlorophyllose, rotund, upper ones ·015-·017 mm., lower ones smaller, marginal ones subquadrate, forming an indistinct border; cells of the under surface smaller, in part subsymmetrically ovate-lanceolate, ·38 mm. x ·15 mm., in the margin rhomboid-hexagonal; perigonium of 3 leaves, which are ovate and obtuse; perichætial bracts very small, erect, in an imbricated cylinder, whitish, exterior ones minute, interior ones much longer, reaching ·76 mm., all broadly ovate, shortly acuminate or slightly obtuse, cellules almost empty, below rectangular, above rhomboid; setæ on the short branches, solitary, aphyllous, vaginula 1·5 mm. high, at the base ·05 mm. in diameter, thickish and still thicker above, erect, straight, pallid, very smooth; thecæ erect, cylindrical, not constricted below the mouth, base attenuate, minute, ·95 mm. x ·42 mm., of delicate construction, pallid, when dry smooth, not shining; annulus persistent, when evolute ·045 mm. in diameter, simple, of biseriate cells; peristome simple, of 16 equidistant teeth, at the base clothed by the annulus, lanceolate, ·165 x ·05 mm., rather obtuse, reddish, plane, entire, trabeculate, densely papillose, somewhat glabrous towards the base; spores ·022 x ·025 mm., green, well furnished with chlorophyll, papillose; operculum conical from the base, with reddish margin, and short, straight, obtuse beak, ·028 mm. high; calyptra campanulate, ·9 mm. high, sulcate, quadrifid, with bifid laciniæ, truncate, whitish, apex somewhat brown, quite glabrous, the younger forms slightly twisted.

Hab.: Wolston Scrub, *C. J. Wild.*

LEPIDOPILUM, Bridel.

Mosses with creeping stems, fertile branches again divided, very rarely bearing fruit on the primary stems. Leaves compressed, arranged in about 10 unequal series, rarely with intermediate series obsolete, formed of elongated and often shining cellules; border of leaf distinct or obsolete. Thecæ on erect or drooping, rather roughened peduncles;

operculum subulate-acuminate; peristome with external teeth contracted, narrow, very rarely equal to the internal ones; internal ones with narrow, carinate-convex processes rising from a short membrane or sessile; calyptra fimbriate at the base, often with scattered branchlets below.

L. australe, *Broth.* (n. sp.), Paper No. 1, New Austr. Mosses, p. 17. Diœcious; pallid green, silky, complanate; stems reaching 3 cm. in height, with leaves about 3 mm. wide, erect or ascending, the base lengthily and densely fusco-radiculate, sparingly branched, straight, not attenuate; leaves very densely crowded, when moist erecto-patent, asymmetrical, flat, oblong-lanceolate, shortly acuminate, very acute, margins flat or at the base slightly revolute, not limbate, entire; nerves 2, very short, orange, almost obsolete or none; cellules elongate, very narrow, lower ones short and broad, golden, in the margins fairly numerous, oval, golden; perichætial bracts many, small, acuminate, entire; setæ to 1 cm. in length, erect, rather straight, very slender, red, very smooth; thecæ oblong-cylindrical, sub-erect, red, 2 mm. long, mouth not at all constricted. Other parts unknown.

Hab.: Harvey's Creek, Russell River, on branches, *Bellenden-Ker Expedition.*

CRYPHÆA, Bridel.

C. flexinervis, *Broth.* (n. sp.)

Hab.: Near Brisbane, ***Field Naturalists.***

C. brevidens, *C.M.*

Hab.: Southern border of Queensland, *J. F. Shirley.*

METEORIUM, Bridel.

M. flexicaule, *Tayl.* in Hook. Fl. N. Zeal. (*M. squamatum*, C.M.) Stems pendulous, flexuous, very slender indeed, 4 to 10 in. long. Leaves dull-yellow or brownish, loosely imbricate, ovate-cordate or subspathulate, shortly acuminate, concave, not striated, margin quite entire except at the obscurely toothed base; nerve produced to the middle.

Hab.: Brisbane scrubs, ***Field Naturalists.***

POROTRICHUM, Bridel.

P. deflexum, *Mitt.* (*Hypnum Leichhardti*, Hampe.) Diœcious; pallid green, 3 to 4 in. long. Stems erect, slender, base angulate, subnude, clothed with oblong, obtuse, aristate, appressed, squamiform leaves, upper parts of stem compressed, completely covered with leaves; branches distichous, irregularly pinnate. Leaves distichous, imbricate, cauline, cymbiform, concave, subenervate, shortly ovate-lanceolate, apex subcucullate, shortly recurvo-acuminate, margin erect, entire; cells of the borders small, angulate-rotundate, brownish, those of the central area elliptical, with small oval ones intermixed, pellucid, in other parts delicately linear; the hyaline diaphanous leaves of the branches similar in shape, but gradually narrower and smaller. Perichætial bracts squarrulose, with broad enfolding base, and lanceolate-acuminate reflex apex, entire; basilar cells lax, subhexagonal, pellucid, in the apices of the bracts linear, elsewhere similar to those of the base. Seta ascending, about an inch in length. Only one theca on the

specimen; this was obovate, but operculum and calyptra were wanting. A variety with filiform stem, and pendulous elongated branches; resembles *Phyllogonium augustum*.—*E. Hampe* in Linnæa.

Hab.: Near Brisbane, *Field Naturalists*.

FISSIDENS, Brid.

F. (Eufissidens) calodictyon, *Broth.*, Paper No. 1, New Austr. Mosses, p. 6. Diœcious; gregarious, very small, pallid, not at all shining; stems about 3 mm. high, erect, rather straight, simple, radiculose towards the base with long brown radicles, laxly foliose, leaves scarcely more than 1 mm. long, 4-5 jugate, when moist erecto-patent, very pellucid, lower leaves the smaller, upper ones to 1·4 mm. long, lanceolate, acute, with shortly excurrent nerve, cuspidate, entire, margined with lutescent border, narrow, biseriate, always at the apex protracted, and longer than the true lamina; nerve flexuose, lutescent, below about ·04 mm. wide, in the point shortly excurrent, cellules lax, oval-hexagonal, ·025-·03 mm. x ·015-·017 mm., sparingly chlorophyllose, very shining; perichætial bracts large, with lamina truly ventricose; vaginula oval, ·35 mm. high, brown; seta terminal, to ·8 mm. high, from the base often genuflexed erect, very slender, below ·1 mm. thick, above ·06 mm., pallid red, very smooth; thecæ inclinate or horizontal, straight, asymmetrical, shortly necked, about ·6 mm. in length, when dry not constricted below the mouth, of delicate texture, pallid, very smooth; peristome simple, of 16 purple teeth which are connate at the base ·04-·05 mm. wide, densely papillose and trabeculate, split to the middle; spores ·015 mm., pallid ferrugineous, granulate; operculum conical, shortly rostrate, rostrum erect, ·2 mm. wide. Calyptra unknown. Male plant very small, gemmiform, adhering to the radicles of the feminine plant, bracts minute, not limbate, obtuse, true lamina denticulate, apical and dorsal laminæ crenulate.

Hab.: Ashgrove, on earth, *C. J. Wild*.

Order LICHENES.

The following new species of Lichens, described by the Rev. F. R. M. Wilson, of Kew, Victoria, are from a collection made by that gentleman while on a visit to this colony in July last:—

LEPTOGIUM, Ach.

L. cærulum, *Wilson.* Thallus membranaceous, lobato-laciniate, lobes rotund, sinuate, cærulean blue, thinly strewed with white and sprinkled here and there with white farinose spots and marked with very slender longitudinal white lines; beneath tomentose, fuscescent, with a nude paler or white margin. Apothecia not seen.

Hab.: On the bark of trees in scrub, Southport, Queensland, *Rev. F. R. M. Wilson*.

L. denticulatum, *Wilson.* Thallus cæruleo-plumbeous, membranaceous, thin, minutely rugulose, centre much divided and pulvinate, circumference lobate, undulate and sinuate, lobes crenate and crispate. Apothecia small, spadices rufous, concave; margin

elevated, pallid, subfimbriate-crenulate. Spores fusiform-ellipsoid, attenuate at both ends, but more at one end than the other, 5-septate and with a longitudinal division in the 4 middle cells; ·02 x ·008 mm.

Hab.: On tree in maritime scrub, Southport.

L. sphinctrinum, *Nyl.* Thallus plumbeo-cærulescent, membranaceous, thin, dilated (to 2 or 3 in.), lobato-divided, complicate, lobes rotundate; upper surface very closely and minutely granulato-rugulose, or simply ruguloso-unequal, under surface somewhat smooth. Apothecia rufous, moderate, plane or somewhat concave, with thalline margin tumid, neatly sphinctrino-plicate or rosulato-plicate (to about 10 folds). Spores ellipsoid, attenuate at each apex, generally 5-septate and also longitudinally divided; ·03 x ·013 mm.

Hab.: On tree in maritime scrub, Southport. The receptacle of the apothecium is often bullato-protruded or pyriformi-prominent.

L. carneolum, *Wilson* (sp. nov.) Thallus obscurely plumbeous or fusco-olivaceous, firm, smooth, somewhat shining or opaque, dilated, 2 to 4 in. wide, lobate, sinuate, plicate, and undulate; lobes rotundate, imbricate. Apothecia small, generally ·5 mm. diam., rarely over 1 mm.; disk pallido-rufescent, at first plane or concave with thin entire thalline margin, at length convex with margin withdrawn. Spores fusiformi-ellipsoid, attenuate at each end, 3 to 5-septate, not longitudinally divided, ·015 to ·023 x ·004 to ·007 mm.

Hab.: On trees in the Blackall Ranges.

L. atro-viride, *Wilson* (sp. nov.) Thallus dark-green, almost black, membranaceous, orbicular, about 2 in. diam. Monophyllous, confusedly plicate and undulate at the centre and radiato-plicate towards the circumference, which is slightly revolute downwards. Apothecia not seen.

Hab.: On trees in maritime scrub, Southport.

CALICIUM, Ach.

C. chlorosporum, *Wilson.* Thallus pale-glaucous, moderately thick, effuse. Apothecia all black, shining, height ·8 mm. or less; stipe ·1 mm. or less in thickness; capitulum turbinato-lenticular or globoso-turbinate, ·3 mm. diam. Spores light-green, fusiformi-oblong, ·005 to ·008 x ·0015 to ·0025 mm.; bilocular, no visible septum.

Hab: On decorticated Eucalyptus, Wolston, Queensland, *Rev. F. R. M. Wilson.*

C. fulvo-fuscum, *Wilson.* Thallus whitish or albido-cinerascent, moderately thick, effuse. Apothecia ·7 mm. high; stipe nigricant, ·1 mm. thick; capitulum fulvo-fuscous, turbinate, ·25 mm. diam.; margin fulvescent. Sporal mass black, prominent upwards. Spores fuscescent, sphærical or sphæroidal, diam. ·005, with fusco-nigricant locule.

Hab.: On rail, Redbank, Queensland, *Rev. F. R. M. Wilson.*

C. stenosporum, *Wilson.* Thallus cinerascent. Apothecia black; stipe ·2 mm. high, ·1 mm. thick; capitulum globose, ·2 mm. diam. Spores dilutely nigrescent, fusiform, ·008 x ·003 mm., 1-septate, with locule in each cell.

Hab.: On decaying Eucalyptus timber, Upper Coomera, Queensland, *Rev. F. R. M. Wilson.*

C. trachelinum, *Ach.*, **var. queenslandiæ,** *Wilson*. Thallus glaucous-white, somewhat thick. Apothecia long, capitulum globoso-turbinate, below rufous, sporal mass black. Spores fusco-nigrescent or nigro-fuscescent, delineated by a black line, ellipsoid, often constricted in the middle, 1-septate, ·001 to ·008 x ·003 to ·005 mm.

Hab.: On dead wood, Killarney.

C. atro-nitescens, *Wilson* (sp. nov.) Thallus cinerascent or cinereous, effuse. Apothecia all black, shining, ·5 to ·7 mm. high, stipe stout, ·15 to ·2 mm. thick; capitulum globoso-turbinate, ·3 to ·4 mm. broad, disk flat. Spores fuscous, ellipsoid, simple, ·006 to ·008 x ·004 to ·005 mm. Epispore somewhat thick and reddish, paler than the fusco-nigrescent nucleus.

Hab.: On decorticated tree, Helidon, and Hill End, South Brisbane. Associated with *Pyrgillus fallax*. Apparently growing on the same thallus, and clouding it with a cinerascent tinge.

C. victoriæ, *C.K.*, **var. albo-carneum,** *Wilson*. Thallus white, thin. Apothecia all black, ·4 mm. high, stipe ·08 mm. thick; capitulum at first lenticulari-turbinate, ·16 mm. broad, at length lenticular and flat, ·3 mm. broad. Sporal mass black. Spores fuscescent, simple, ellipsoid, ·005 to ·006 x ·002 to ·003 mm., limited by a black line, epispore thick.

Hab.: On decorticated tree, Rosewood, and on decorticated Eucalyptus, Esk.

This variety is readily known by the tawny flesh-coloured and smooth thallus, owing to its thinness showing the colour of the wood through it. The species is common in Victoria, and somewhat variable.

C. victoriæ, *C.K.*, **var. jejunum,** *Wilson*. Thallus cinereous, thin. Apothecia black, somewhat shining, 1 mm. high; stipe ·1 mm. thick; capitulum turbinato-lenticular, ·3 to ·4 mm. broad. Spores fuscescent, delimited by a black line (or, when seen with higher power, epispore somewhat thick, reddish, and lighter than the fusco-nigrescent nucleus), ·007 x ·003 to ·005 mm., simple, compressed, so that when viewed from the side it is bacillar, ·0015 thick.

Hab.: On decorticated Eucalyptus, Waterworks road and Pechey's Scrub, on Enoggera Creek.

This variety is not uncommon in Victoria.

C. prætenue, *Wilson*. Thallus carneo-albid, thin, smooth. Apothecia very minute, generally visible only by the aid of a lens, ·3 mm. high; stipe more or less hyalino-fuscescent or fuscous, ·04 mm. thick; capitulum lenticular, fuscous-black, ·2 mm. broad. Spores dilutely nigrescent, ovoid or oblongo-ovoid, broader at one end, simple or obsoletely bilocular ·005 x ·002 mm., narrower and nearly bacillar when viewed from the side.

Hab.: On decorticated and decaying tree, place unknown. Possibly a variety of *C. pusiolum*, Ach., as described by Nylander.

C. glebosum, *J.M.*, **var. concinnum,** *Wilson*. Thallus glauco-cinerascent, verruculose. Apothecia fuscous-black, to 1 mm. high; stipe ·15 mm. thick; capitulum turbinate, 1 mm. broad. Spores fuscescent, with fuscous outlines, 1-septate, constricted in middle so as to frequently appear like 2 globular spores united, each cell containing a globular locule.

Hab.: On decorticated tree, Manly, Queensland, *Rev. F. R. M. Wilson*.

C. glebosum, *J.M.*, **var. glaucescens,** *Wilson.* Thallus pallido-glaucescent, smooth, towards the centre rising into crowded glebuli as if diffracto-glebose. Apothecia about ·7 mm. high, stipe ·15 mm. thick; capitulum at first turbinato-globose, at length lenticular, to ·4 mm. broad, margin cinereo-rufescent, at length black, disk at first thinly pruinose, at length covered with a black sporal mass. Spores with viridi-nigrescent nucleus and light-reddish epispore delineated by a dark line, uniseptate, and generally constricted in the middle, ·005 to ·008 x ·003 to ·005 mm.

Hab.: On decorticated Eucalyptus, Esk.

TRACHYLIA, Fries.

Thallus thin, granulose, or subleprose, or foreign. Apothecia black, sessile, cupuliform, open; sporal mass black. Spores nigricant or fuscous-black, ellipsoid or oblong, 1-septate, rarely pluriseptate. Spermatia oblong or ellipsoid.—*Rev. W. A. Leighton*, Lich. Fl. of Great Brit. No. 47.

T. tricincta, *Wilson* (sp. nov.) Thallus fusco-cinerascent, effuse. Apothecia small, to ·6 mm. diam., appressed, convex. Sporal mass closely conglutinated. Spores fuscescent, ellipsoideo-oblong, constricted at the middle ·008 x ·004 mm., 1-septate, and further marked with a fuscous bar across each half of the nucleus.

Hab.: On decorticated tree, Helidon.

The spores bear a resemblance to those of the *Trizosta* section of *Pyrgillus*; but are narrower and constricted in the middle, and are at least apparently 1-septate.

PYRGILLUS, Nyl.

Thallus thin. Apothecia shortly conoid-cylindrical, base uniate, above truncate, for the most part hollow, and filled by the sporal mass, which does not protrude beyond the margin. Spores 8 in ascus, 3-septate, fusco-nigricant. Spermagonia with filiform arcuate spermatia.

P. australiensis, *Wilson.* Thallus cinereous, somewhat thick, unequal. Apothecia black, conico-cylindrical, ·5 mm. high, ·5 mm. thick; excipular margin albo-pruinose; sporal mass not extending beyond the margin. Spores nigro-fuscescent, oblongo-ellipsoid or globoso-ellipsoid, ·008 x ·006 mm., 3-septate, rarely 5-septate and then larger.

Hab.: On the bark of a tree near Landsborough, Queensland, *Rev. F. R. M. Wilson.*

P. caliciisporus, *Wilson.* Thallus white, smooth, somewhat thick. Apothecia black, but albo-suffused beneath and also on the receptacular margin, conico-cylindrical, ·3 mm. high, ·3 mm. thick at the base, immersed in thalline verrucæ. Sporal mass extended as far as ·2 mm. high. Thecæ clavate, only seen containing young spores. Spores oblong or sphæroideo-oblong, ·0025 to ·005 x ·002 to ·003 mm., olivaceo-fuscescent, 1-septate, containing a locule in each cell.

Hab.: On decorticated trees, Killarney, Queensland, *Rev. F. R. M. Wilson.*

This plant supplies a link between the genera *Trachylia* and *Pyrgillus.*

P. fallax, *Wilson* (sp. nov.) Thallus white, but more or less cinerascenti-nubilate, determinate. Apothecia cylindrical, ·25 mm. high, 3 mm. thick, with poriform opening at the apex, which dilates with age, and, as the wall grows thin, at length collapses at the mouth. Spores ellipsoideo-fusiform, usually arcuate, dilutely fuscescent, uniseptate, with indistinct locule in each cell, ·003 to ·008 x ·002 to ·003.

Hab.: On decorticated tree, Helidon.

PHYSCIA, Nyl.

P. comosa, *Nyl.*, Syn. p. 416, **var. alata,** *Wilson.* Thallus white or glaucous-white, laciniate, ciliate at the margin and on the upper surface, expanding at the apices into broad ascending lobes, crenate, undulate, somewhat nude and scrobiculate, beneath decorticate and exposing the glaucous pulverulent gonidia. Apothecia not seen.

Hab.: On twigs of bushes in scrub, Killarney and Rosewood, Queensland, *Rev. F. R. M. Wilson.*

The plant adheres loosely to the small twigs by its laciniæ, and raises the lobes on each side like a moth's wings. It is probable that this is a new species which may be called *P. alata,* Wilson.

HEPPIA, Næg.

Thallus obscurely virescent or pallid, squamose with squamæ closely adnate to the soil, hypothallus sparingly evolute. Apothecia solorinoid, impressed in the squamæ, somewhat concave or almost plane; spores simple.

H. brisbanensis, *Wilson.* Thallus whitish or cinereous or nigrescent, opaque, adglutinato-squamulose, squamules crustoso-confluent. Apothecia fulvo-rufous, urceolate, crowded; spores simple.

Hab.: On bare earth amidst grass, Hill End, South Brisbane, Queensland, *J. F. Shirley.*

OCELLULARIA, J.M.

O. cricota, *Wilson.* Thallus albid-opaque, minutely striated. Apothecia emergent, to 1 mm. wide, excipulum thick, white, disk widely aperient, depresso-albo-velate. Spores hyaline, lineari-fusiform, acuminate at one end, ·09 x ·0015 mm., locules about 20, lenticular.

Hab.: On trees in scrub, Southport, Queensland, *Rev. F. R. M. Wilson.*

GRAPHINA, J.M.

G. (Platygrammina) pyelodes, *Wilson.* Thallus glauco-pallid, thin, delimited by narrow black line, longitudinally ridged, ridges more pallid or whitish. Apothecia rounded or lengthened, small, ·5 to 1·5 mm. wide, elevated ·5 to ·75 mm. high, wholly thallino-vestate, disk more or less widely opened. Spores hyaline, oblong, generally tapering to one end, ·04 to ·05 x ·015 mm., 12 to 24-locular, and longitudinally divided to 5 times. Paraphyses fine, entangled, sprinkled with minute granules.

Hab.: On trees in scrub, Blackall Ranges, Queensland, *Rev. F. R. M. Wilson.*

SARCOGRAPHA, J.M.

S. (*Phæoglyphis) actinota, *Wilson.* Thallus olive-yellow or sulphur-yellow, crustaceous, smooth, almost shining. Stromata scarcely elevated, plane, separate and rotund, diameter 2 to 10 mm., or confluent and irregular, covering several centimetres, margin white; lirella black, pruinose, radiate and branched, breadth about ·05 to ·075 mm. Spores more or less dilutely nigrescent, ·01 x ·004 mm., 4-locular, locules lentiform, terminal locules at each end larger than the others. Paraphyses straight, rather indistinct. Hypothecium white.

Hab.: On various trees in maritime scrub at Southport, in scrub at Upper Coomera, and at Killarney, Queensland, *Rev. F. R. M. Wilson.*

S. (Phæoglyphis) actinota, *Wilson*, **f. pulverulenta,** *Wilson.* Stromata convex, pulverulent, smaller than in the type; lirella sunk for the most part in the pulverulent stroma, and fewer and less radiate than in the type.

Hab.: Upper Coomera, Queensland, *Rev. F. R. M. Wilson.*

Order FUNGI.

PANUS, Fries.

P. patellaris, *Fries,* Hym. Eur. 490; Cooke Brit. Fung. No. 1324; Illus. t. 1144c. (Plant supposed to resemble a little dish.) Resupinate, coriaceous, plane or cup-shaped, orbicular, externally pallid, furfuraceous, adnate by the scarcely porrect vertex, margin involute, gills concurrent, dingy ochre, somewhat crowded, entire. Spores oval (6 x 4 μ). In some respects very similar to *P. ringens*, but differs in the distinctly mealy pileus, and the smooth, not striate, margin. Pileus $\frac{1}{2}$-in. or a little more.—*Cooke, l.c.*

Hab.: In Europe found on the branches of Cherry trees. The Queensland specimens were found growing on bark at Toowoomba by B. Crow.

POLYPORUS, Fries.

P. (Lignescentes) subzonalis, *Cooke,* Grev. xix. 44. Suberous, rather thin, rigid, sessile. Pileus reniform, or laterally connate (2 to 3 in. diameter), pubescent, at length smooth, radiately rugose, faintly concentrically zoned, with numerous linear zones, wholly cream-coloured, substance similar, margin acute, strongly incurved, hymenium nearly of the same colour, pores punctiform, rounded, $\frac{1}{6}$ μ diameter.—*Cke. l.c.*

Hab.: On wood, Daintree River.

Differs from *P. zonalis* in the paler more pubescent pileus, whitish hymenium, shorter tubes, and larger pores.—*Cke. l.c.*

FOMES, Fries.

F. (Fomentarii) concavus, *Cooke,* Grev. xix. 44. Pileus very hard, convexo-flattened, semi-orbicular, deeply decurrent and effused

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* *Phæoglyphis,* J.M.—The genus *Glyphis* is divided into two sections by Dr. Jean Müller: *Euglyphis* with hyaline spores, and *Sarcographa* with fuscous spores. The subgenus *Sarcographa* is subdivided into sections, of which *Phæoglyphis* is distinguished by its apothecia, which are pallid when moist, and have pallid hypothecia.

behind, becoming nearly black, concentrically sulcate, and somewhat rugose or tuberculate, 4 to 6 in. diameter, comparatively thin ($\frac{1}{2}$ to $\frac{3}{4}$ in.), covered with a hard crust. Substance very thin and floccose, together with the elongated stratose tubes, wood-coloured, pores very minute, round, regular, punctiform, scarcely visible. Hymenium concave, pale ochraceous; margin thin, incurved, flexuous, sterile.—*Cke. l.c.*

Hab.: On tree-trunks, Johnstone River.

Allied to *F. sulcatus.—Cke. l.c.*

SCLERODERMA, Fries.

S. umbrina, *Cke. et Mass.*, Grev. xix. 45. Stipitate, peridium globose ($2\frac{1}{2}$ to 3 cm. diameter), coarsely rugulose below (when dry), very thin, fragile, and perfectly glabrous above, breaking away irregularly, dirty pale ochre, darkest below; stem equal ($2\frac{1}{2}$ cm. long, $\frac{1}{2}$-cm. or more thick), coarsely and irregularly furrowed (when dry), dark-brown, passing downwards into a dense bulbose mass of intricate mycelium; mass of gleba dark umber-brown; spores globose, echinulate, brown, 10 μ diameter; dissepiments almost obsolete at maturity.—*Cke. l.c.*

Hab.: Queensland, on the ground, locality not given.

PUCCINIA, Pers.

P. malvacearum, *Mont.*, Sacc. Syll. Fung. vii. 686. Under the leaf, aggregated, the patches scattered; telentospores in hemispherical sori, the centre at first clothed by the persistent epidermis, circumference nude, red, beneath umbilicate, densely congested, ovoid-oblong, 35-75 x 12-26 μ, brown, smooth, in the middle subconstricted, shortly acuminate, very lengthily pedicellate; pedicels hyaline, as much as 120 μ long.

Hab.: In Europe this fungus infests many Malvaceous plants; in Queensland on Hollyhocks, Toowoomba.

XYLARIA, Schr.

X. scopiformis, *Mont.* (*Hypoxylon scopiforme*, Kunze.)

Hab.: On decaying fruit of *Flindersia australis*, Bunya Mountains, *H. Tryon.*

ASCHERSONIA, Mont.

(After F. M. Ascherson, a writer on poisonous fungus.)

Small yellow or pallid, fleshy, superficial fungi, growing on living vegetable substances. Stroma carnose, hemispherical, turbinate or pulvinate, deeply coloured, clothed at first with a fugacious byssine layer. Perithecia (or loculi) subimmersed in the membranaceous stroma, very thin, erect, fibrose-cellulose, the pores opening widely (at length rimose-confluent), pertuse. Sporules fusiform, hyaline, occasionally with 3-4 oil-drops, spuriously septate.

A. tahitensis, *Mont.*, Cent. vi. n. ii. 122, t. 6, f. 3, in Ann. Sc. Nat. 1848; Sacc. Syll. Fung. iii. 619. Stromata hemispherical, truncate, obtuse, yellow, 1-2 mm. in diameter; perithecium erect, minute, $\frac{1}{3}$-mm.

in diameter; pores joined together by rimose channels, sporules minute, fusiform, at both ends acute, 15 x 2-4, with 4 oil-spots, hyaline; basidia filiform, 20-25 μ long.

Hab.: Found on the foliage of *Cyrtandras* in Tahiti. In Queensland found on foliage of native plants, Harvey's Creek and Mulgrave River, *Bellenden-Ker Expedition*.

GLÆOSPORIUM, Mont.

G. pestiferum, *Cke. et Mass.* (n. sp.)

Hab.: On vines at Rockhampton.

This seems to be the most destructive of all the fungi which have attacked the vines in Queensland; but, like most others, could be kept in check by a free use of sulphur at its first appearance.

CERCOSPORA, Fries.

C. viticola (*Ces.*) *Sacc.*, Syll. Fung. iv. 458. (*Cladosporium viticolum*, Ces.; *C. ampelinum*, Pass.; *Cercospora vitis*, Sacc.; *Septonema vitis*, Lév.; *Helminthosporum vitis*, Pir.) Spots aggregated, subcircular or irregular, 2-10 mm. in diameter, when dry ochraceous, scarcely marginate; mycelium often hypophyllous, here and there very densely and fasciculately filiform, septulate, joints 50-200 x 4-5, straight, ochraceous, above obtuse and obsoletely denticulate; conidia elongate-obclavate, above attenuate, 3-4 septate, furnished with oil-spots, 50-70 x 7-8, olivaceo-ochraceous.

Hab.: Known to infest the living vine foliage in Europe. In Queensland on American vine-leaves, Bundaberg, *J. Keys*.

ISARIA, Pers.

(From *isos*, equal.)

Stroma vertical, clavate or branched everywhere, conidia-bearing composed of thin longitudinal hyphæ or fibres. Basidia formed from the apices of the hyphæ. Conidia minute, globose or ellipsoid, continuous, hyaline.

I. fuciformis, *Berk.*, Austr. Fungi. Pale, slender, filiform, 1 cm. high, below simple, then moderately branched, branchlets acute. Conidia very minute, globose.

Hab.: Gladfield, *C. J. Gwyther*.

PROTOMYCES, Unger.

(From the Greek: First fungus.)

Coloured spots on leaves. Spores spheroid, subhyaline or ochraceous, furnished with a thick epispore, forming intrusive masses beneath the epidermis in the parenchyma of the leaf.

P. macrosporus, *Unger.* (*Physoderma gibbosum*, Wallr.) Spots gibbose, scattered, oblong, resembling little hills covered with the raised epidermis of the leaf: spores spherical or ellipsoid, large, 35-80 x 35-60 μ, epispore 4-5 μ thick, flavid, with hyaline plasma; sporidia cylindrical-oblong, 2-2·2 x 1.

Hab.: In Europe this fungus is found on composites and umbelliferous plants; in Queensland on *Hydrocotyle asiatica*, at Stanthorpe.

PILOBOLUS, Tode.

(From *pilos*, a cap, and *boleo*, to eject.)

Flocci simple, continuous, when mature ventricose above and clavate, terminated by an indurated globose sporangium; dehiscent; including a globose sporidium.—*Cooke* in Handbook of British Fungi.

P. crystallinus, *Tode.* Apices of the flocci at length clavate, obovate; sporangium hemispherical.—*Cke. l.c.* "At first appearing under the form of a small yellow *Sclerotium*, which gradually acquires a stem, becomes inflated above, and loses its yellow hue; often densely tufted; very fugacious."—*Berkeley.*

Hab.: Burpengary, on dung, *Dr. J. Bancroft.*

There are twelve species of this beautiful genus of moulds known; two, however, *P. crystallinus* and *P. roridus*, are the best known. This is, I think, the first time any have been met with in Australia.

---

* Strumella sacchari, *Cooke*, Grev. xix. 45. Pustules gregarious, erumpent, black, patelloid or subclavate, with a short stem-like base, or cylindrical-multiform (½-mm. diam.); hyphæ short, hyalinæ, simple; conidia cylindrically elliptical, continuous, pale-fuscous, 10 to 12 x 3 μ.

Hab.: On dead sugar-cane, Brisbane, *H. Tryon.*

* Peronospora hyoscyami, *D'Bary.* Mycelium conidiophorus, thick, tall, 5-7 or 8 times dichotomous; branches spreading, attenuated straight or slightly curved, the ultimate ones diverging in a very obtuse angle, short, conico-subulate, straight, acute. Conidia small ellipsoid, very obtuse, membrane with a violaceous tint. 13-24 = 13-18.

Hab.: On young tobacco plants near Brisbane, *H. Tryon.* The young tobacco plants were found to be badly affected with this blight in most parts of Queensland during 1890.

---

* Specific characters not given in Bulletin No. iv. (the first Botany Bulletin). If the diagnosis is not to hand of any new cryptogamic plant when first recorded the same will be given in some following Bulletin.

ADDITIONS TO THE N. S. WALES FLORA.

Order MYRTACEÆ.

Tribe LEPTOSPERMEÆ.

AGONIS, DC.

Section Ataxandria.

A. ericoides (n. sp.) A dwarf heath-like shrub, the virgate branchlets silky-pubescent. Leaves crowded towards the ends of the branches, very narrow-linear, 3 or 4 lines long, the apex more or less pungent. Flower-heads about 4 lines diameter, sessile, terminal, containing from about 3 to 6 flowers. Outer bracts ovate to broadly orbicular, scarious, striate, brown, a little over 1 line diameter, with woolly ciliate edges, closely imbricating and enclosing the flowers so that only the clear white petals are visible. Calyx-tube very open, glabrous within, silky-hairy on the outer side, $1\frac{1}{2}$ line long and nearly as wide. Lobes about $\frac{1}{2}$-line broad and not so long, petaloid. Petals white, orbicular, about twice the size of the calyx-lobes. Stamens about 30, forming an unbroken ring, longer than the petals; filaments somewhat flexuose; anthers rather large, oblong, the connective gland not always prominent. Style slightly exserted, stigma minute, ovary with few ovules. Fruit not collected.

Hab.: Charley's Forest, Braidwood District, N. S. Wales, *Wm. Bäuerlen*, Oct. 1886.

Order FILICES.

Tribe POLYPODIEÆ.

WOODSIA, R. Br.

(After Joseph Woods, an English botanist.)

Ferns with cæspitose stipitate fronds, the stipes sometimes jointed and separating at the joint, membranous, tender, pinnately divided. Veins pinnated, simple or forked. Sori globose, situated on the back of a vein or veinlet. Involucre soft-membranous, either from the first calyciform or pateriform, or more or less globose, and sometimes in an early stage completely covering the entire sorus, at length opening at the top, the margin or mouth irregular, lobed or fimbriated. Capsules globose, on short stalks, arising from a small punctiform receptacle.—*Hook.*, Gen. Fil. and Sp. Fil. i. 59.

W. lætevirens, *Prentice* (sp. nov.) Rhizome tufted. Fronds narrow-lanceolate, of a delicate green colour, bipinnate below, bipinnatifid in the upper pinnæ. Pinnæ broad and obtuse, quite glabrous, as are the pale straw-coloured stipites; pinnules with shallow rather coarse serratures, as in the North American *W. obtusa*, which is a much more robust and coarse fern. Length of pinnæ very uniform, about 1 in., the upper somewhat shorter; pinnules broad and obtuse, with several large sori on each; involucre that of the second section (*Perrinia*), frail, bursting as the capsules enlarge and then forming a few delicate laciniæ at the base of the sorus. Fronds from

a few inches to a span high, membranous and delicate, with remarkably broad and blunt pinnæ. The development of the involucre is hardly of generic value in *Woodsia:* in the first section (*Physematium*) it is, though frail and delicate, amply developed, nearly covering the sorus at first; in the second division (*Perrinia*) the involucre is less developed and a few narrow laciniæ to represent it after the maturity of the sorus; at first it is cup-shaped. The fern in question belongs here; while in the typical division—*vera*, as it has been called, comprehending the rare little subarctic *W. hyperborea*, R. Br., and *W. glabella*, R. Br.—the involucre is a mere shallow cup or hyposorous scale, not to be seen till the capsules are removed. In choice of habitat this species resembles *W. caucasica*, J. Sm., a much more divided species and belonging to the first section.

Hab : This beautiful plant was collected by Mr. Wm. Bäuerlen, collector for the Sydney Technological Museum, at the limit of perpetual snow, in the Snowy Alps between Sydney and Victoria.

Upon receipt of the specimens of the above plant from Mr. Bäuerlen I took them to belong to some superb growth of *Cystopteris fragilis*. My friend Dr. Prentice, however, is of opinion that they represent rather a new species of *Woodsia*, a widely spread genus which has not hitherto been met with in Australasia; and to that excellent pteridologist I am indebted for the description here given.—*F.M.B.*

By Authority: James C. Beal, Government Printer, William street, Brisbane.

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BULLETIN No. 9.

MAY, 1891.

[Botany Bulletin No. III]

BOTANY:

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such interested as may request them. Address all applicat "The Under Secretary for Agriculture, Brisba

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BRISBANE:

BY AUTHORITY: JAMES C. BEAL, GOVERNMENT

1891.

NOTICE.

Probably the late fine seasons enjoyed by Australia, which have caused a luxuriant growth of vegetable life, have induced persons to take a deeper interest in native plants than usual, and thus I have received an interesting number of specimens of late, and, finding amongst them several new species, think it advisable to issue another Bulletin, although it is so short a time since my last was published.

I take the opportunity afforded of thanking those correspondents to whom I am indebted for specimens for the zeal they have manifested in collecting and forwarding the plants of their various districts, and hope that they will continue the good work, and thus assist in enlarging our knowledge of the Queensland Flora.

As all Bulletins issued by the Department are consecutively numbered, and for the most part treat on the various phases of agri-horticultural pursuits, botanists and others desirous of these publications are requested to ask for the "Botany Bulletins," of which the present is the third that has been issued.

F.M.B.

May, 1891.

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BOTANY.

CONTRIBUTIONS TO QUEENSLAND FLORA.

Order MAGNOLIACEÆ.

Tribe WINTEREÆ.

DRIMYS, Forst.

D. semecarpoides, *F. v. M.*, Vict. Nat., March, 1891. A tree said to attain the height of about 25 ft. Leaves on petioles often 1 in. long, chartaceous, glabrous, from ovate to elongate-elliptic, but gradually narrowed into a cuneate base, rounded-blunt at the summit, attaining 8 in. in length and 2½ in. in breadth, very grey on the underside, punctular-rough, the costular veins very thin, venules much concealed. Peduncles about 2 or 3 in. long, glabrous. Flowers unknown. Pedicels few or two, or even solitary. Sepals two, very small, roundish. Ripe carpels solitary, almost glabular, ¼ to ⅓ in. in diameter.

Hab.: Rockingham Bay, *Dallachy, F. v. M.*, Fragm. vii., 18; Russell Creek, *W. Sayer, F. v. M., l.c.*

This species differs from *D. Howeana* in almost entire absence of aroma, in leaves of larger size, of thinner texture, of far less prominent venulation, and with the dots not transparent, in the perfect separation of the sepals, and probably also in characteristics of the flowers. It comes very near to ***Drimys rivularis,*** Vieillard, of New Caledonia, but the petioles are much longer, the venules of the leaves more occult, the inflorescence is less ramified, the ovularies are fewer, and also in this case the flowers, which in an only specimen available here for comparison are not developed, may be different.—*F. v. M.*

Order MENISPERMACEÆ.

Tribe CISSAMPELIDEÆ.

STEPHANIA, Lour.

L. aculeata, n. sp. (The prickly stemmed Stephania.) A prickly climber, the stems ribbed, prickles reflexed, of irregular length. Leaves broadly triangular, and more or less peltate at the base, 2 to 2½ in. long, and the same broad at the base, apex glandular apiculate, lower angles rounded, 5 to 7-nerved, margins entire, glabrous, pale or glaucescent on the under side. Petioles slender, armed with reflexed prickles, 1 to 1½ in. long. Panicles of male flowers axillary, very slender, 2 to 4 in. long, the branches almost capillary, with few small lanceolate petiolate leaves or bracts, on lateral shoots; these bracts are often larger and of a similar shape to the stem leaves. Flowers minute, mostly under 1 line in diameter when expanded. Sepals 6, imbricate, obovate, prettily veined. Petals 6, scarcely half the length of the sepals, rotundate, imbricate. Stamens united in a very short column, bearing at the summit 3 rather large didymous anthers. Female flowers and fruit unknown.

Hab.: Mount Gravatt, *Field Naturalists*, Nov., 1887.

This hitherto undescribed plant is probably closely allied to the tropical African species, of which also the fruit is unknown—*S. lætificata,* Miers. The flowers of that plant, however, are said to have but 3 petals.

Order PORTULACEÆ.

CALANDRINIA, H. B. et K.

C. uniflora, *F. v. M.* in Trans. Phil. Inst. Vict. iii., 41, and Fragm. 1, 177; Flora Austr. 1, 172. Rootstock thick, simple, cylindrical or fusiform, erect, bearing a dense tuft of narrow-linear leaves of 2 to 4 in. Scapes numerous from amongst the leaves, 8 to 10 in. high, 1-flowered and leafless, except 1 or 2 minute scales. Flowers rather large, probably pink. Sepals broad and thin, 3 to 4 lines long. Petals usually 6 or 7. Stamens very numerous, the inner ones much longer than the others; anthers oblong. Styles 4, erect, shortly plumose and stigmatic along their whole length. Capsule about as long as the sepals, 4-valved. Seeds numerous, black, and shining.—*Benth.* in Flora Austr. l.c.

Hab.: Walsh River, *J. Barclay-Millar.*

Order MALVACEÆ.

Tribe HIBISCEÆ.

HIBISCUS, Linn.

H. microlænus, *F. v. M.*, Fragm. ii., 116 (under *H. solanifolius*), Fl. Austr. i., 211. Apparently a shrub, densely clothed with a scabrous, rigid, velvety, or softer and almost floccose stellate tomentum. Leaves on rather short petioles, from ovate to oblong-lanceolate, 1 to $1\frac{1}{2}$ in. long, obtuse, slightly toothed, thickly and rigidly tomentose. Flowers purplish, on pedicels rather longer than the petioles. Bracteoles 7 to 9, sometimes very minute, sometimes half as long as the calyx. Calyx $\frac{1}{2}$ in. or rather more, densely scabrous-tomentose, deeply divided into lanceolate 1-nerved lobes. Petals 1 to $\frac{1}{2}$ in. long, more or less stellate-tomentose outside where exposed in the bud. Capsule globular, more or less hairy. Seeds more or less bordered or covered with long woolly hairs.—*F. v. M.* and *Benth.*, *l.c.*

Hab.: Lawn Hill, Gulf country, *F. H. Hann.*

These specimens were fragmentary but evidently belonged to the above; the capsule was densely beset with short stiff hairs.

Order ZYGOPHYLLEÆ.

TRIBULUS, Linn.

T. leptophyllus (n. sp.) A procumbent silky-pubescent annual extending 2 or more feet. Leaves all alternate; leaflets 2 or 3 pairs, linear, the end ones the longest, often attaining over 1 in. in length. Flowers small, yellow, on filiform pedicels often as long or nearly as long as the leaves. Petals under 3 lines long. Stamens 5, perfect anthers, and 5 smaller ones with imperfect capitate anthers, ovary silky. Fruit tomentose, mixed with long hairs, 3 lines long, pyramidal. Style rigid, persistent, about half as long as the fruit; coccus tubercles basal.

Hab.: Walsh River, *T. Barclay-Millar.*

This new species is very closely allied to *T. angustifolius*, Benth., differing from that species in the less number of leaflets, in its small yellow flowers, and in only half the stamens having perfect anthers.

Order RUTACEÆ.

Tribe ZANTHORYLEÆ.

MELICOPE, Forst.

M. pubescens (n. sp.) A small tree, with light-coloured bark, the branchlets somewhat flattened and usually opposite, the whole leafy part of the plant and inflorescence softly pubescent. Leaves opposite, 3-foliolate, often on lateral shoots reduced to a single leaflet or pair of leaflets on a petiole of half-an-inch or less. The pairs of leaves sometimes, but not always, of unequal size; leaflets sessile, lanceolate, glabrous, except the veins on the upper surface, often sharply acuminate, the lateral ones unequal sided at the base, 3 to 7 in. long, 1 to 2½ in. broad; veins prominent on both sides, the primary ones looping some distance from the margin, margins entire; oil dots minute, not numerous. Flowers in lateral and axillary trichotomous cymes; peduncles shorter than the petioles; flowers on short pedicels, calyx-lobes 4, nearly orbicular, about 1 line. Petals 4, valvate, recurved when the flower is fully opened, thick linear, with inflexed tips, about 3 or 4 lines long, disk entire, glabrous. Stamens 8, those opposite the petals shorter than the other four, filaments much dilated and ciliate in the lower half. Style terminal, rather thick, long as the stamens, hairy in the lower half. Stigma small, slightly lobed. Ovary glabrous, 4 celled, 2 ovules in each cell. Fruit not yet collected.

Hab.: Yandina and top of Blackall Range, March, 1891, in full flower.—*Field Naturalists.*

Order RHAMNEÆ.

SCHISTOCARPÆA, *F. v. M.*, Vict. Nat., March, 1891.

Calyx deeply five-cleft, its lobes semilanceolar, deciduous. Petals orbicular-rhomboid, short-stipitate, longitudinally rolled inward. Stamens hardly longer than the petals, much concealed by them. Filaments filiform. Anthers almost ovate, basifixed, longitudinally dehiscent. Style very firm, longer than the stigmas. Disk slightly undular at the margin. Ovulary three-celled, almost fully emerged. Fruit roundish, somewhat turgidly trilobed, by the persistent short calyx-tube surrounded only at the base; exocarp crustaceous, irregularly trivalvular; endocarp receding, thinly pergamenous, each of the three portions splitting to near their base along the inner side, much ruptured and twisted on the outer side. Seeds roundish, very convex at the outer side, much flattened and somewhat trigonous at the inner side; testula chartaceous; albument none; cotyledons outward very convex; radicle minute, ovate, included.

This genus must stand near Colubrina, to which it could be referred as a section; but the course of the primary venules of the leaves is different, the calyx-tube under the fruit is shorter and less completely adherent, the cotyledons are outward very turgid and the albument is wanting. The last-mentioned characteristic this new plant of ours has in common with Scutia and Dallachya, but both have a fruit of different structure, ours approaching that of Macrorhamnus.—*F. v. M.*

S. Johnsoni, *F. v. M.*, Vict. Nat., March, 1891. A plant of laurinaceous aspect. Leaves on very short stalks, scattered, of firm texture, mostly lanceolar-ovate, acuminated, entire, glabrous, 3 to 7 inches long, 1—2½ inches broad, shining on both sides but paler beneath, their primary venules rather distant, costular-adscending; their ultimate venules

reticularly joined. Stipules semi-lanceolar, fugacious. Panicles small or even diminutive, axillary and terminal, formed by cymous clusters of flowers, beset with short scattered hairlets. Bracts very small, varying from almost lanceolar to nearly deltoid. Calyx about $\frac{1}{8}$ inch long. Petals somewhat shorter than the calyx, membranous, pale-yellowish, as well as the stamens glabrous. Style and ovulary bearing short hairlets. Ripe fruit measuring rather more than $\frac{1}{3}$ inch, dark outside, glabrous; valves of the exocarp somewhat bifid from the summit; endocarp of each fruitlet after secession divaricately spreading. Seeds about $\frac{1}{5}$ inch measurement; testule greyish-brown, without lustre, irregularly reticulate-regular. Embryo almost amygdaline. *Colubrina Travancorica*, doubtfully admitted by Beddome into that genus, has some resemblance to our new species, but the leaves are almost opposite, bear some indument and are distinctly serrulated; and as the mature fruit remains unknown, the generic position continues also dubious.—*F. v. M., l.c.*

Hab.: On Mount Bartle-Frere, *Stephen Johnson.*

Order LEGUMINOSÆ.

Tribe HEDYSAREÆ.

ZORNIA, Gmel.

Z. diphylla, *Pers.*, **var. filifolia,** n. f. An erect or procumbent annual plant, the stems and branches very slender and densely studded with prominent brown oval glands. Leaflets about 1 in. long, $\frac{1}{3}$ line broad, with the glands of the stem. Bracts and flowers smaller than in other forms, but very glandular.

Hab.: Walsh River, *T. Barclay-Millar.*

In the same packet of specimens were two other forms of this widespread variable plant, the one being referable to the var. *gracilis*, Benth., the other only differing from the normal in that the whole plant, like var. *filifolia*, was thickly studded with dark-coloured glands.

Tribe CASSIEÆ.

CASSIA, Linn.

C. Brewsteri, *F. v. M.*, 4th Ann. Rep., 17, 1858; Fragm. i., 110. A large shrub or small tree, usually glabrous. Leaves of few distant pairs of leaflets, petiole without glands. Leaflets narrow-oblong or oblong-lanceolate, about 2 or 3 in. long, petiolules 3 to 6 lines long, obtuse, often emarginate, narrowed at the base. Racemes 3 to 9 in. long, pendulous. Bracts minute. Pedicels slender. Sepals about 3 lines long. Petals stipitate narrow-ovate, rather obtuse, about 4 lines long. Filaments of the 3 long lower stamens longer than the petals, swollen into a glandular appendage about the middle, with ovate anthers, the other stamens shorter than the petals. Pod often over 1 foot long and an inch broad, thick, flattened, glossy brown, the edges persistent after the inside has fallen away. Seeds thick, glossy, ovoid, 5 or 6 lines long, embedded in or surrounded by a pulpy sweet substance free from the discepiments.

Hab.: Copperfield, Clermont, Comet, and other inland localities of North Queensland.

The pod figured in Wt. Ic., t. 252, under the name *C. bacillus*, Roxb., is very like the pod of our plant, but not the leaves or flowers. But I think all or at least the two first forms of *C. Brewsteri* might have appeared as forms of *C. javanica* Linn.

C. Brewsteri, var. sylvestris, *Bail.* (*C. Fistula*, var. *silvestris*, Rumph. Herbarium Amboinense ii., 88, pl. 22). A tree of medium size, erect trunk with dark rough bark, wood very bitter, branchlets angular, nearly glabrous. Leaves linear in outline, slightly hoary; leaflets of about 8 or 9 pairs, broadly ovate, the terminal ones $2\frac{1}{2}$ in. long, slightly glossy on the upper surface, pale beneath, on short petiolules. Flowers as above. Pod glabrous, glossy dark brown, about $1\frac{1}{2}$ ft. long, and about $\frac{1}{2}$ in. broad and nearly as thick compressed-cylindric, deeply indented between the seeds, suture margin entire and straight, about a line broad, internal arrangement as above. Seed not so glossy as the first form, roundish, about 3 lines long.

Hab.: Kamerunga, *E. Cowley*.

Dr. G. E. Rumphius, in Herbarium Amboinensis, vol. ii., 88, seems to think the tree might be called, "the old man's consolation tree," for although it is not known to possess medicinal properties, yet the long tough pods have a use, for the old men beat their backs with them, to keep their backs from becoming stiff.

Some trees at Upper Nerang agree in foliage and wood with this form, but I have seen no pods.

C. Brewsteri, var. tomentella, *Benth.*, Fl. Austr. ii., 282. A slender erect tree of 50 or 60 ft., the branchlets and foliage often densely clothed with a close short tomentum. Leaves shorter than the two other forms. Leaflets short and broad, almost rotund, about 1 in. long, very dark green and glossy on the upper surface, pale and velvety beneath. Flower-racemes and flowers smaller. Pod nearly-terete, softly velvety, $1\frac{1}{4}$ to 2 ft. long, and about $\frac{1}{2}$ in. diameter, internal arrangement and seeds similar to the last.

Hab.: Logan River, range about Obum Obum, Rosewood, and Mt. Perry. The pods of this form are very similar to those of *C. Sieberiana, DC.*

Plants receive distinctive names for the convenience of their being referred to individually, and according to the amount of the distinction are separated generically, specifically, and again as varieties of each species. With regard to this latter division much perplexity and confusion is often created by some botanists discarding from their writings all plants which in their opinion are merely forms or varieties of the species they enumerate. So different, however, are some of these varieties from the normal plant that the non-professional botanist can hardly believe them other than distinct species. The plan I have adopted in dealing with the native flora has been to use a distinct name for each variety. By this method nurserymen can keep the varieties in stock under their distinctive names, and persons will not find when too late that they have purchased quite a different plant from what was in their mind when giving the order, as might occur when attention is not paid to keeping the varieties distinct. I have been led to make these few remarks on account of having added another variety to the above Cassia.

Order MYRTACEÆ.

Tribe MYRTEÆ.

EUGENIA, Linn.

Section JAMBOSA.

E. Fitzgeraldi, *F. v. M.* and *Bail.* A small erect graceful tree, quite glabrous, of from 20 to 30ft. in height, bark slightly fibrous. Leaves ovate-lanceolate, membranous 3 to 5 in. long, $1\frac{1}{2}$ to 2in. broad, the apex obtuse, but more or less elongated, tapering towards the apex, oil-dots minute, scarcely visible except in the young leaves, primary veins rather distant and irregular, looping to form the intramarginal one far

within the margin, petioles short, usually under ½in. long, deep green and glossy like the upper surface of the leaf. Flowers very fragrant, in terminal trichotomous panicles, shorter than the leaves, the lower branches often bearing three flowers, all pedicellate. Calyx-tube turbinate, about 2 lines, lobes very obtuse, petals about twice as long as the calyx-lobes, pure white, ovate, stamen numerous, exceeding 1in. in length, filaments very slender. Anthers minute. Style filiform longer than the stamens. Ovary 2-celled, ovules numerous in each cell. Fruit globular, bright red, 1 in. diameter, containing a solitary seed.

Hab.: Summit of Blackall Range, *Field Naturalists*, March, 1891; Richmond River, *R. D. Fitzgerald*, F. v. M.

Probably this bears the most fragrant flower of any Queensland plant, and most certainly we have nothing to surpass it in our gardens; the odour resembles that of the jasmine or orange flower, but much stronger than any plant of that genus known to me.

While these pages were being printed—following my usual custom—I sent to Baron Mueller for the Victorian herbarium specimens of all the new species recorded. From these he found the new *Eugenia*, which I had named *E. odoratissima*, was identical with a species from the Richmond River, which he had described, but not published under the name of *E. Fitzgeraldi*. I have therefore, at Baron Mueller's request, allowed my name to lapse that this lovely species may bear the name of our mutual friend and fellow worker, R. D. Fitzgerald, the author of an excellently illustrated monograph of the Australian Orchideæ.

Order LORANTHACEÆ.

LORANTHUS, Linn.

L. dictyophlebus. *F. v. M.* Fruit globose, red, about five lines diameter, apex umbonate, very juicy, closely resembling red currants when ripe.

Hab.: Eudlo Creek scrubs, on an *acacia*, *Field Naturalists*, March, 1891.

Order RUBIACEÆ.

Tribe PSYCHOTRIEÆ.

PSYCHOTRIA, Linn.

P. Simmondsiana, var. glabrescens (n.f.) A slender, usually erect glabrous shrub, more or less branched, 5 to 7 ft. high. Leaves lanceolate, 1½ to 2½ in. long; petiole about ¼ in. long, pale on the under surface; primary veins alone visible, about 5 on each side of midrib, looping near the margin. Stipules brown, more or less hairy, but very deciduous. Flowers small, sessile, or nearly so, few, on very short branches at the end of a slender 4-angled peduncle of 1 to 1½ in. long. Calyx hairy, 5-toothed. Corolla ovoid, velvety outside, bearded within. Lobes about as long as the tube. Fruit globose, white, about 3 lines, when dry (and especially when gathered before maturity), showing the prominent ribs of the pyrenes.

Hab.: Bellenden Ker Range, *Expedition*, 1889; Eudlo and Yandina Scrubs, *Field Naturalists*, 1891. In the tropical plants the panicle is slightly more developed, and the stipules are larger, more hairy, and more persistent.

P. Simmondsiana, var. exigua (n.f.) A slender slightly branched shrub of 3 or 4 ft., glabrous except the flowers. Leaves narrow, lanceolate, ½ to 1¼ in. long.

Hab.: Macpherson Range, *H. Schneider* and *H. Tryon*, March, 1891. From this locality Messrs. Schneider and Tryon also gathered specimens of the normal form.

Tribe SPERMACOCEÆ.

SPERMACOCE, Linn.

S. Jacobsoni (n. sp.) (After Geo. Jacobson, the collector of the specimens from which the plant has been described.) A glandular-hispid annual of 12 to 15 in. high. Stems few, erect. Leaves linear-lanceolate, usually under 2 in. long, somewhat coriaceous, veins very obscure, upper surface and midrib on the underside covered by light hair-like scales, margins revolute, the two last leaves close under the heads of flowers. Stipular sheath somewhat prominent, bordered by rather long bristles. Flowers small, very numerous, in dense terminal heads, often exceeding $\frac{1}{2}$ in. diameter, the flowers intermixed with long scarious white cilia. Calyx-lobes narrow-linear, hirsute on the back, about $1\frac{1}{2}$ line long, tube slender, of equal length with the lobes. Corolla scarcely exceeding the calyx-lobes, scaly-hairy outside, glabrous on the inner surface, the tube very hairy inside. Stamens inserted at the orifice of the tube and alternating with the lobes of corolla, about as long as the lobes. Anthers large oblong. No mature carpels on the specimens received.

Hab.: Musgrave Telegraph Station, Cape York Peninsula, *Geo. Jacobson.*

S. uniseta (n. sp.) (Stipules often reduced to a single bristle.) An erect slightly-branched hispid annual, under 1 ft. high. Stems slender, not so hispid as the leaves. Leaves narrow-linear, less than an inch long, with revolute margins. Stipules reduced to a single-branched bristle, closely appressed to the stem and rather long, but often concealed by the scale-like hairs of the leaves. Flowers small, in dense terminal heads. Calyx-lobes acute, often unequal, longer than the tube, bristly. Corolla-lobes ovate, patent, nearly glabrous, under a line long, tube about as long as the lobes, bearded inside except at the base. Stamens inserted about the middle of the corolla-tube, filaments very slender. Anthers very small. No mature carpels on the specimens examined.

Hab.: Musgrave Telegraph Station, Cape York Peninsula, *Geo. Jacobson.*

Order COMPOSITÆ.

Tribe ASTEROIDEÆ.

DICHROCEPHALA, DC.

(Name referring to the two-coloured head of florets.)

Flower-heads heterogamous globose or disciform, many-flowered, outer female florets in numerous serus, those of the disk hermaphrodite. Involucre inconspicuous, scales subbi-seriate, subequal, membranous-margined. Receptacle convex columnar or turbinate, naked. Corolla of the female florets rotate-campanulate 3 to 4-fid or tubular dentate; of the hermaphrodite florets tubular dilated above, 4 to 5-toothed, or campanualate constricted below. Anther 2-toothed at the base. Style-branches flattened with lanceolate or ovate appendix. Achenes com-pressed, pappus wanting (or of the hermaphrodite florets very minute). Annual herbs. Leaves alternate, dentate or lyrate-pinnatifid. Flower-heads small with inconspicuous involucres in terminal, often divaricate, panicles. Female-florets white; hermaphrodite-florets violet or purple.—*H.* and *B.*, Gen. Plant. i., 260.

D. latifolia, *D. C.*, Prod. v., 372; Oliver's Fl. Trop. Africa iii., 303. An erect or ascending herb, ½ to 5 ft. high, asperulous or minutely setulose; stem and branches angular. Leaves lyrate-pinnatifid, acute or obtuse, terminal lobe ovate or ovate-rotundate, or lateral lobes wanting, dentate, sessile or attenuate at the base into a late or slender petiole, membranous, 1½ to 3 in. long; upper ones smaller. Flower-heads subglobose, many-flowered, 1½ to 3 lines diameter, on unequal pedicels ranging up to 1 in. long, in lax terminal divaricate panicles. Scales of involucre subbiseriate, obovate or broadly elliptical, membranous-margined, fimbriate-ciliate, nearly glabrous. Receptacle depresso-convex, glabrous, papillose-pitted, constricted below, about ½ line broad, corolla of female-floret tubular 2 to 3-dentate; of the hermaphrodite florets campanulate constricted below. Achenes obovate, compressed, glabrous or very nearly so.—*Oliver, l.c.*

Hab.: Baron von Mueller writes me that he has received specimens of this plant from North Queensland. The plant enjoys a wide range, being indigenous to tropical and South Africa, the East Indies, Hongkong, and many other places.

Tribe HELIANTHOIDEÆ.

ZINNIA, Linn.

Z. australis (n. sp.) An erect-branching hispid annual, about 1½ ft. high. Stem angular, hairs white and very numerous on the upper part of the plant. Leaves sessile, ovate-acuminate, 5 or 7 nerved, scabrous on both sides, about 2 in. long, 1 in. broad near the base. Flower heads pedunculate above the last leaves, showy purple rayed, involucre globose-turbinate, about 4 lines long. Bracts closely imbricate, obtuse, with scarious margins. Ray-florets 8 purple on the inside, nearly an inch long, 3-toothed, style-branches filiform, obtuse; disk-florets exceeding the involucre, forming a prominent conical centre of the flower head. Achenes flat, ovate, with a prominent midrib, more or less scabrous with ciliate margins.

Hab.: Walsh River, *T. Barclay-Millar.*

It is most interesting to meet with an indigenous species of *Zinnia* in Australia as hitherto the genus was thought to be confined to the new world.

Order MYRSINEÆ.

Tribe EUMYRSINEÆ.

ARDISIA, Linn.

A. (Bladhia) pachyrrhachis, *F. v. M.*, Vict. Naturalist, March, 1891. An arborescent glabrous shrub of about 15 ft. high. Leaves attaining 8 in. in length and 1½ in. in breadth, of a fine texture, the pellucid streaks or dots scarcely perceptible, elongate-lanceolate, rather blunt, the base cuneate, not glossy, the veins almost concealed. Petioles short. Peduncle about ½ in. long, bearing small deciduous leaves. Rhachis thick, ⅓ in. long, cicatricous. Pedicels about 1 in. long, very thin, up to 40 in a fascicle, at first bent downward. Calyx very small, its lobes semi-orbicular-deltoid. Corolla about 2 lines long, deeply 5-cleft, the segments about twice as long as broad, acuminate, copiously spotted by purplish-black dots or short streaks, before expansion distinctly twisted. Filaments extremely short, anthers pointed,

somewhat cordate-sagittate, rather more than half as long as the corolla, pale. Style subulate, nearly 1¼ line long. Fruit globular, 3 to 4 lines diameter. *F. v. M., l.c.*

Hab.: In the upper regions of Mount Bartle-Frere, *Stephen Johnson.*

This species offers some approach to Myrsine. It differs from *B. brevipedata* (*Ardisia breripedata*) already in larger, thicker, and blunter leaves with much concealed dots, in the stout and more elongated rachis of the fascicle of flowers, also in much longer and more rigid pedicels.

B. pseudo-jambosa is more distinct. It seems quite distinct from any of the numerous Asiatic Bladhias, unless *B. reclinata* and *B. Amboinensis* (*Ardisia reclinata* and *A. Amboinensis*, Scheffer, Commentatio de Myrsinaceis Archipelogi. Indici, 69 et 75).

* By the right of precedence all the Ardisias have to change their names into Bladhias, as Thunberg established that genus seven years before Swartz defined and published Ardisia.—*F. v. M., l.c.*

Order LOGANIACEÆ.

Tribe EULOGANIEÆ.

MITRASACME, Labitt.

M. longiflora, *F. v. M.*, in Flora Austr. iv., 353. A slender erect annual of 1 to 1½ ft., simple or slightly branched. Leaves radical, rosulate obovate-oblong, mostly 3-nerved and under an inch long, those of the stem reduced to few distant pairs of minute scales. Flowers few, on long pedicels at the end of the stem or branch, calyx about 1 to 1¼ line long, with very short obtuse or scarcely acuminate lobes. Corolla-tube slender, about 5 or 6 lines long, lobes short. Stamens inserted about the middle of the tube, anthers linear, included. Stigmatic lobes rather long, linear, somewhat dilated and flattened.

Hab.: Walsh River, *T. Barclay-Millar.*

Order SANTALACEÆ.

Tribe OSYRIDEÆ.

SANTALUM, Linn.

S. obtusifolium, *R. Br.*, Prod.; Flora Austr. vi., 215; Fragm. viii., 11. A tall slender shrub with a dark green foliage. Leaves opposite, or the uppermost rarely alternate, linear-oblong lanceolate, or broadly oblong, obtuse, rather thick, the margins often revolute in drying, 1 to 2½ in. long. Flowers few, in small, shortly pedunculate axillary racemes or cymes, the short pedicels or lateral branches rarely bearing 2 or 3 flowers. Perianth not 2 lines long, the tube companulate, shortly adnate at the base, the free part much longer; lobes shorter than the tube, triangular, concave. Scales or glands alternating with the stamens, ovate or triangular. Ovary semisuperior, with an elongated style, the placenta acuminate as in *S. lanceolatum.* Fruit purplish, globular or ovate-globose, 3 to 6 lines in diameter, the scar of the apex enclosing a small area.—*Benth. and Muell., l.c.*

Hab.: Macpherson Range, *H. Tryon* and *H. Schneider*, March, 1891. Specimens in fruit only.

* This view is not taken by Bentham and Hooker, and as I arrange according to their Genera Plantarum this new species is placed here under Ardisia.—F. M. B.

Order EUPHORBIACEÆ.

Tribe CROTONEÆ.

ACALYPHA, Linn.

A. indica, var. australis (n. f.) A weak herbaceous pubescent shrub, branches angular. Leaves ovate, sometimes acuminate, under 2 in. long on the specimen examined, base very slightly cuneate or almost truncate, margins crenate-serrate; petioles slender, longer than the blade. Spikes axillary sessile, ½ to 1¼ in. long, terminated by a few minute male flowers, female flowers rather crowded at the base; bracts broadly cuneiform, toothed. Capsules concealed by the bract, 3-seeded, slightly hispid. Seed ovoid, nearly smooth.

Hab.: Walsh River, *T. Barclay-Millar.*

Order URTICACEÆ.

Tribe ARTOCARPEÆ.

FICUS, Linn.

F. gracilipes (n. sp.) (Named from the very slender stalk of fruit.) A small tree of a somewhat drooping habit, and semi-deciduous like *F. Cunninghamii*, glabrous, or the stipules and young shoots slightly hoary; bark light coloured; branchlets slender. Leaves on petioles of 1 to 1¼ in., ovate or oblong-elliptical, very shortly and obtusely acuminate, rounded at the base, 2½ to 4 in. long, 1¼ to 2¼ in. broad, deep green on both sides, coriaceous, glossy above, midrib prominent, primary veins almost transverse and parallel but not conspicuous, the reticulation between them fine and close. Stipules narrow, under ½ in. long. Receptacles axillary, solitary, or in pairs, smooth, globular, about 1 in. diameter, of a deep purple when ripe, red with prominent light-coloured spots before maturity, the spots not so conspicuous in the ripe fruit. Peduncles slender, 4 to 5 lines long, with a minute brown bract at the base. Male flowers few near the orifice; perianth sessile, 3-lobed; anthers large, reniform, not exceeding the perianth. Stigma long, often much dilated towards the base. Gall flowers stipitate and often much elongated.

Hab.: Southern Queensland, *Rev. B. Scortechini.*

The above is from specimens received from Mr. Arthur Exley off a tree growing at Brookfield. The tree had probably been planted, but the species is said to be found on rocky ground in the neighbouring scrub. Amongst Australian species this new one seems to approach nearest to *F. Henneana*, Miq. I have used the term semi-deciduous on account of the great uncertainty of the fall of the leaf in trees of this nature; for instance, one may frequently meet with trees of *F. Cunninghamii* growing side by side, the one bare, the other clothed with healthy foliage. The same phenomenon may be observed in *Eucalyptus platyphylla* and other trees of this habit.

F. Hillii (n. sp.) Hill's weeping fig-tree. Tree of somewhat irregular habit, the upper shoot and branches drooping over to one side, all parts glabrous, or a very slight hoariness on the stipules and young petioles, the shoots thickly and prominently dotted with white lenticelles. Leaves on petioles of ½ to ¾ in., ovate-oblong, abruptly and very shortly acuminate, tapering from above the middle to a sharply cuneate base, the lamina ending in minute thick glandlike lobes, 2 to 4 in. long, 1 to 1½ in. broad at the widest part, coriaceous and glossy above, paler beneath, the transverse veins close, very fine, looping within the margin in an even intramarginal vein, the venules

few. Stipules ½ to ¾ in. long. Receptacles sessile, frequently solitary, axillary, globular, about 4 or 5 lines diameter, rosy red with small white dots, basal bracts 3, minute, orbicular, persistent, much thickened at the base, velvety outside. Male flowers few, intermixed with the females. Perianth trimerous; anthers not exceeding the perianth. Style very slender, long as the ovary. Stigma short.

Hab.: Scrubs of tropical Queensland, *Walter Hill.*

From the above description it will be seen that the present new species approaches very close to *F. benjaminea*. In general habit, however, it differs so much that the one cannot be mistaken for the other. From seeds or plants brought from the North by Mr. Hill several years ago fine specimen plants are to be seen in our parks and private grounds. I have never met with the true *F. benjaminea* in a wild state in tropical Queensland, neither have specimens been sent to me from there; and think it probable that it was specimens of *F. Hillii* that were received from J. Dallachy by Baron Mueller, and recorded by him in Fragm. vi. 195, and again by Bentham in Flora Austr. vi. 167, as *F. benjaminea*. One might easily make this mistake from dried specimens. Besides the differences which will be observed in the above diagnoses I am informed by Mr. Robt. McDowall, who has trees of this new species growing on Wickham Terrace Reserve, that while *Ficus benjaminea* is most difficult to root from cuttings *F. Hillii* takes root very freely.

Order CONIFERÆ.

AGATHIS, Salisb.

A. (Dammara) Palmerstoni, *F. v. M.*, Fourth Suppl. to the Syst. Census of Austral. Plants 4 (1889), *Agathis Palmerstoni*, F. v. M. collect.

Finally very tall; branchlets angular; leaves comparatively small, narrow-elliptic, but gradually narrowed into the very short petiole. blunt, somewhat oblique, slightly or hardly paler beneath; staminal spikes ellipsoid-cylindric, solitary; strobiles egg-shaped, their racheoles extremely numerous, broader than long, narrowly thickened at the summit.

Mr. Johnson calls this the largest and noblest jungle tree, ascending from the river to high mountain altitudes. So far as can be judged from the material before me this northern Kauri Pine of Queensland is specifically distinct from the southern, which occurs on the mainland near Wide Bay and on Fraser's Island, but may also exist in North Queensland. The leaves are never lanceolar, much smaller, and particularly narrower, also always obtuse, as compared to those of trees of the typical *D. robusta*, cultivated here and now fully 40 ft. high. Nevertheless, the specimen branchlets may all have been taken from very tall trees, and the leaves may thus become reduced in size and perhaps altered in form. The seeding strobile seems also considerably smaller and proportionately narrower; but our collections contain it not in a fully ripe state, but it is then only 1½ in. broad. The racheoles are remarkably small, because they seem more numerous than in any other congener, as about a dozen in each transverse series can be counted on a side-view of the strobile near its middle; morever, they are almost fan-shaped. The species here now described seems nearest to *D. Moorei* of New Caledonia. In all cases it is preferable to use the earliest of binary names for any plant, whatever other objections can be raised, so long as it is correctly retainable within the genus first adopted. If all ante-Linnean names are to be discarded, then Agathis must precede Dammara in designating the Kauri Pines.

Hab.: Mount Bartle-Frere, *Christie Palmerston;* Mulgrave River, *Stephen Johnson.*—F. v. M., Victorian Naturalist, June.

Order ORCHIDEÆ.

Tribe EPIDENDREÆ.

? LIPARIS, Richard.

L. Simmondsii (n. sp.) (After J. H. Simmonds, Hon. Sec. Field Naturalists' section of R.S. of Ql.) Stems arising from an almost globose rhizome of 1 to 1½ in. in diameter, erect stems, terite, about 3 or 4 in. high, diameter about ¼ in., green, not wholly covered by the sheathing bracts, of which latter there are about 4, prominently striated, the keel more so than the rest and elongated into a subulate point. Leaves usually 2 ovate-acuminate, unequal sided, 5 to 7-nerved, petiolate, about 3 in. long. Peduncle and raceme terminal erect, about 10 in. (Flowers not seen.) Capsules elongated, erect, pyriform, about 1 in. long on pedicels of about 4 lines.

Hab.: On sandy land bordering swamps, Eudlo Creek, *Field Naturalists*, March, 1891.

This plant is probably nearly allied to *Liparis atropurpurea*, Lindl. The flowers, however, are wanted to prove its affinity.

MICROSTYLIS, Nutt.

M. amplexicaulis (n. sp.) Plant terrestrial or growing in masses of decayed epiphytes on the stems of trees. Stems 4 to 6 in. high, arising from globose or oblong tubers of from ¼ to ½ in. diameter, with a small apiculate sheathing scale-like leaf at the immediate base, from which the stem is naked for about 2 in., where there is a broad, deeply, palmately variously lobed sessile bract or leaf about 1 in. in diameter, which surrounds the stem with its lobed lamina in an amplexicaul manner; sometimes there is a second smaller but similar leaf a little higher up the stem. The rest of the stem is occupied by a spike-like raceme of small greenish-white flowers, each subtended by a cordate-acuminate bract, pedicels with ovary about 3 or 4 lines long. Sepals and petals very narrow-linear almost filiform, about 2 lines long. Labellum somewhat reflexed, shorter than the petals, cuneate oblong, slightly cordate at the base, the end sharply 3-toothed or lobed, the central tooth longer than the others, disk with 2 thick glabrous ridges. Column very narrow, incurved, nearly as long as the labellum. Anther small, of a rather bright reddish brown.

Hab.: On the ground and in decayed epiphytes. Scrubs of Eudlo Creek, *Field Naturalists*, March, 1891.

Tribe OPHRYDEÆ.

HABENARIA, R. Br.

H. Millari (n. sp.) (After T. Barclay-Millar.) Slender, about 2 ft. high. Leaves few at base of stem, linear, 3 to 5 in. long, ¼ in. broad, tapering to a blunt point, the lower ones much abbreviated and falcate, sheathing bracts about 6. Raceme occupying about 6 in., bearing about 20 flowers, subtending bract narrow-lanceolate, shorter than the pedicel. Sepals and petals about 2 or 3 lines long, striate, lanceolate. Labellum deeply divided into filiform lobes about 1 in. long, the middle one shorter than the others; spur about 1¼ in. long or twice the length of the pedicel. Anterior processes of the column erect with white globose heads, free from labellum arising from the base of the column. Anther-cells large and deeply separated.

Hab.: Walsh River, *T. Barclay-Millar.*

Order LILIACEÆ.

Tribe ASPHODELEÆ.

DIANELLA, Lam.

D. cærulea, *R. Br.*, var. congesta (*D. congesta*, R. Br., Prod.; Baker, in Journ. Linn. Soc. xiv., 576.) Stems branching, especially from near the base, attaining the height of 2 ft. or more. Leaves distichous, the lamina 1 ft. long and about ½ in. broad, the margins and keel smooth, although the latter is sharply prominent. Sheaths much flattened, with sharp smooth keels, nearly half as long as the lamina. Panicle shorter than the leaves, peduncle flattened, with one or two of the last leaves reduced to erect sheathing bracts. Flowers deep blue, in a few dense sessile cymes, shortly pedicellate, the buds nearly globular, when expanded about ½ in. in diameter. Bracts scarious, brown, ovate-acuminate, small, 1 to 2 lines long. In all the flowers opened most or all the organs of reproduction were metamorphosed into pelaloid bodies.

Hab.: Southport, *H. Schneider.* On the sea coast sand, among the bushes just above high-water mark.

The above plant is, I think, identical with Dr. Brown's one from Torres Straits, but neither Brown, in Prod., or Baker, in Journ. Linn. Soc., describes the flowers. Bentham, in Flora Austr. vii., 16, says that: "The inflorescence in the specimen preserved is scarcely fully developed and almost destroyed by insects.

I have a specimen gathered by R. C. Burton, near Northcote, a few years ago, which has also double flowers, but in nothing else differs from *D. lævis*, R. Br.

Order GRAMINEÆ.

Tribe FESTUCEÆ.

ERAGROSTIS, Beauv.

E. stricta (n. sp.) A slender, erect, hairy, tufted grass, of from 12 to 18 in. high. Leaves narrow-linear, the upper ones 5 to over 6 in. long, convolute so as to appear filiform when dry, the lower ones flat and about 2 lines broad, the woolly hairs about the mouth of the sheath almost concealing the short scarious ligula. Panicle spike-like, 4 or 5 in. long, formed of 8 or 9 alternate spikelets, erect and usually closely appressed to the rhachis, lower ones pedunculate, upper ones nearly or quite sessile, under 3 lines long, and about ⅓ line broad, 4 to 6-flowered. Glumes closely distichous, outer keeled and acute, with the keel and lateral nerves rough, flowering glumes obtuse, with ciliate margins, palea also with ciliate margins. Stamens 3.

Hab.: Walsh River, *T. Barclay-Millar.*

Order FILICES.

Tribe OSMUNDEÆ.

GLEICHENIA, Sm.

G. flagellaris, *Spreng.*; *Baker*, in Fl. of Mauritius and the Seychelles. Fronds 3 or 4 times dichotomously forked, leafy from the first-forking continuously to the top of the ultimate branchlets, the texture rigidly subcoriaceous, the upper surface dark-green and naked, the lower glaucous and with a little ferruginous down on the midrib of the segments. Pinnæ lanceolate, 1 to 2 in. broad, cut down to the rhachis into close adnate entire linear ultimate segments. Veins fine,

distinct, once forked near the base. Sori on the back of the veins, nearer the edge than the midrib, consisting of not more than 4 or 5 capsules.—*Baker, l. c.*, 460.

Hab.: Messrs. Schneider and Tryon brought me, from the top of the Macpherson Range, sterile portions of a *Gleichenia*, of which I think there can be no doubt as to their belonging to the above species. It is a fern of wide range, having been gathered in New Guinea, Java, the Malay Islands, Fiji, Mauritius, Bourbon, and Madagascar, and is considered to include *G. lævigata*, Willd.; *G. bifurcata*, Blume.; *G. bracteata*, Blume.; and *G. muricata*, Bojer.

Order LICHENES.

The following additional Lichens, with the exception of eight marked (*), have been determined by the eminent Lichenologist, Professor J. Mueller, of Geneva. The eight thus separated, together with the whole of the descriptions, have been supplied by Mr. J. F. Shirley:—

LEPTOGIUM, Ach.

L. phyllocarpum, var. isidiosum, *Nyl.* Thallus very crowdedly isidiose or isidiose-furfuraceous on both sides, which are concolorous and sordidly cinereo-virescent. Sterile.—*Nyl.* Syn. i., p. 130.

Hab.: Hill End.

L. tremelloides, var. azureum (Ach.), *Mnt.* Differs from the type only in the thallus being distinctly cærulescent.—*Nyl.* Syn. i., p. 125.

Hab.: Mt. Mistake.

L. chloromelum, *Nyl.* Thallus leaden-blue or plumbeo-virescent, membranaceous, lobate, plicate, longitudinally crowdedly rugose, lobes undulate; apothecia red or fusco-rufous, somewhat concave or plane, bordered by a thick, rugose-plicate or furfuraceo-granulate thalline margin; spores ellipsoid or at both ends attenuate, 3-5 septate (and at the same time occasionally longitudinally divided, loculi 6-12), length ·02 to ·037 x ·01 to ·017 mm.—*Nyl.* Syn. i., p. 128.

Hab.: Bellenden-Ker.

SYNECHOBLASTUS, J. M.

*** S. glaucophthalmus,** *J. M.* Thallus olive-brown, moderate in size (in width ½ in. or more), outspread, here and there fenestrato-dissect, scrobiculate and often granuliferous; apothecia glauco-lilacine, plane or slightly convex, medium, with slightly prominent thalline receptacle, margin very thin; spores as in *S. nigrescens.*—*Nyl.* Syn. i., p. 114.

Hab.: Goodna, *J. F. Shirley.*

SPHÆROPHORON, Pers.

S. australe, *Laur.* Thallus coralloid, smooth, much branched, greenish, becoming pallid, almost white beneath, branchlets semi-terete, main stems flattened; podetia ½ in. to ¾ in. long, flattened, in old forms occasionally channelled; receptacles in width 6-12 mm., lenticulari-compressed, beneath somewhat lacero-aperient; margin cristato-crenate; spores spherical, diameter ·011 to ·015 mm. Syn.: *S. complanatum*, Hook and Tayl.; *S. insigne*, Laur. (s. *S. ceranoides*), is *S. australe, var. insigne, J. M.*

Hab.: Mt. Mistake.

CLADONIA, Hoffm.

C. fimbriata, var. antilopæa, *J. M.* Thallus consisting of crisped imbricated scales, whitish below; podetia small, rarely more than ¼ in., sterile, subulate, scurfy below, slightly ruguse and much paler above. Syn.: *Cenomyce antilopæa*, Del.; *Cenomyce Boryana*, Del.; *Cladonia pergracilis*, Krph. (in part); *Cladonia antilopæa*, Duby.

Hab.: Bellenden-Ker.

C. fimbriata, var. pulverulenta (Del.), *J. M.* Slender, wholly whitish-pulverulent; podetia with apices not scyphose-dilatate. —Lich. Parag., *J. Mull*, No. 11. Syn.: *C. borbonica*, Nyl.

Hab.: Bellenden-Ker.

C. aggregata, var. straminea, *J. M.* Thallus with only the lower or sub-basilar part of the podetia castaneo-rufescent, the other parts everywhere albido-stramineous, slenderly branched, crowdedly ramose, and closely perforate.—Lich. Beit., *J. Mull.*, 95.

Hab.: Bellenden-Ker, and Mt. Bauple.

STEREOCAULON, Schreb.

S. proximum var. nudatum, *J. M.* Podetia 3-6 cm. long, strikingly slender as in the type, almost from the base ramose, with upper branches verrucose-corticate; in other parts nude, glabrous; about the middle fibrillose, a long space below or at times almost from the apex decorticate and very smoothly cartilagineous, bone-white or whitish. Gonidia and spores as in the type.—*J. Mull*, Lich. Beit., 1002.

Hab.: Bellenden-Ker.

USNEA, Dillen.

U. barbata, var. scabrida (*Tayl.*), J. M. Thallus rather erect, very scabrous, pallid cinereo-flavescent, fibrils very crowded, curvate-ascendant, subramose; ramules minutely granulate, uniformly subulate; apothecia at length flattish, clothed at the margin and back with crowded cilia; disk albo-stramineous, pulverulent. Spores broadly ellipsoid, ·01 to ·012 mm. long.—*Hook*, Jour. of Bot. 1847, p. 193.

Hab.: Gowrie.

U. barbata, var. asperrima, *J. M.* Thallus 5 to 7 cm. long, erect, branchlets widespread and divergent, with short, crowded, and sub-horizontal fibrils; the latter terete, rigid, and very attenuate at their apices, branches and branchlets thickly tuberculiform-papillose or subspinulose-papillose and olivaceous, papillæ obtuse with vertices subefflorescent; sub-cortical stratum sanguineo-rufous or purple; apothecia unknown. In habit it holds an intermediate place between *U. barbata, var. cornuta* and *var. strigosa.* The central axes are hollow and arachnoideo-celluligerous.—*J. Mull*, Lich. Beit., No. 390.

Hab.: Brisbane River.

U. barbata, var. hirta, *Fr.* Thallus 1 to 3 in. in height, erect or subpendulous, albido-virescent or albido-flavescent, minutely and crowdedly fibrillose, very much branched, branches often having verrucose-pulverulent soredia. Apothecia small or mediocre.—*Nyl.* Syn. i., p. 267.

Hab.: Bellenden-Ker.

U. barbata, var. strigosa, *Krph.* Branches erect, about half an inch in length, divaricately ramose; branchlets very densely clothed with outspread fibrillæ, which are not sorediate.—*J. M.*, Lich. Beit. No. 925.

Hab.: Brisbane River.

RAMALINA, Ach.

R. Eckloni, var. membranacea (Mnt.), *Laur.* Thallus very thin; 1 to 1½ in. in length, drying a yellowish brown; laciniæ dichotomously branched, flat, with margins narrowly reflexed, longitudinally striate, terminations bifurcate, apices subacute or bluntish. Apothecia subterminal, reniform, in dried specimens reddish-brown. Spores broad, straight or slightly curved as in the normal form of the species. Syn.: *R. pellucida*, Tayl.; *R. fraxinea, var. membranacea*, Laur.; *R. yemensis, f. membranacea*, Nyl.

Hab.: Albert River.

R. dendriscoides, *Nyl.* Thallus in Queensland forms 1 to 3 in. long, suberect, pallid-flavescent; laciniæ slender, smooth, freely and intricately branched; branches flattened, sometimes wider at the bifurcations; terminations very fine and delicate. The stems are sparingly marked by erumpent white soredia. Apothecia not seen.

Hab.: Goodna.

R. dendriscoides, var. minor, *J.M.* Laciniæ compressed or tereti-compressed, much smaller than the type; apothecia 1 to 2 mm. broad in the terminations of the branches, flat or at length convex; spores ·012 to ·015 by ·0055 to ·006 mm., straight or slightly curved.—*J. M.*, Lich. Socotrensium, p. 2.

Hab.: Goodna.

R. leiodea, *Nyl.* Thallus 1 to 2 in. long, springing from flattened scale-like base, pallid viride-flavescent or pallid-flavescent; laciniæ branching freely from main stem near base, but seldom or very sparingly ramulose, canaliculate, very faintly scrobiculate, margins occasionally fringed with sparse patent cilia. Apothecia pallid, to 2 mm., concave, with fine prominent paler margin, subpedicellose, generally affixed ⅔ of total length from base, the remaining third reflexed as in *R. calicaris*. Spores slender, sparingly arcuate, ·014 by ·0045 mm.

Hab.: Sandgate, on bushes of *Wikstræmia indica*.

PYRGILLUS, Nyl.

P. javanicus, *Nyl.* Thallus thin, pallid, granulose; apothecia black, the marginal excipulum albo-pruinose; spores nigricant, oblong-globose, 3-septate, ·01 mm. long, seldom greater.—*Nyl.* Syn. i., 169. Syn.: *Calicium javanicum*, Mnt.; *Trachylia javanica*, Nyl.

Hab.: Brookfield, on bark.—*Field Naturalists.*

STICTINA, Nyl.

S. crocata, var. esorediata, *J. M.* Thallus drying a deep-brown above, 1 to 3 in. wide, upper surface smooth, scrobiculate, without soredia, or with soredia only at the margins. Lobes short, broad, terminations blunt or rounded; beneath covered with a short dark brown or nigro-fuscous tomentum. Pseudocyphellae small, yellow, pulverulent. Apothecia not seen.

Hab.: Mt. Mistake

STICTA, Ach.

S. demutabilis, *Krph.* Thallus substipitate, opaque, subscrobiculate, at first sight resembling *Stictina fragillima* in colour and lacimation; laciniæ dichotomously branched, 3 to 4 mm. wide, subcanaliculate with blunt bifurcate terminations, lower surface brown and bare, dotted over with small white soredia. Apothecia marginal, subpedicellate, concave or flat, disk becoming almost black, margin entire.

Hab.: Bellender-Ker.

S. carpolomoides, *Nyl.* Thallus lurid or subcervine, 2 to 3 in. long, somewhat rigescent, slightly shining, stipitate or substipitate, scrobiculate or sparingly scrobiculate-unequal, lobate incised, lobes variously divided, and with sinuate-crenate margins, beneath ochraceo-fuscescent, slightly tomentose or almost nude, cyphellae pallid. Apothecia fusco-spadiceous or spadiceo-fuscescent, medium, 2 to 4 mm., marginal or sub-marginal, bordered by an entire, concolorous, firm, opaque margin. Spores colourless, fusiform, 3 septate ·036 to ·038 by ·01 to ·012 mm.—*Nyl.* Syn. i., 354.

Hab.: Bellenden-Ker.

* **S. glaucescens,** *Krph.* Thallus foliaceous, glaucescent, pallid or pallid cinereo-virescent, scarcely rigid, usually opaque, 8 to 10 dm. wide, variously laciniately divided, finally distinctly scrobiculate, the laciniæ sinuately and irregularly pinnatifid, apex dichotomous, apices of the lobes obtuse; beneath nude, flavescent or ochraceo-pallescent, rugulose, partly gibberulose, pseudocyphellae minute, citrine. Apothecia sparse, generally marginal, to 2 mm., at first closed, cephaloid, then opened, with concave disk, fusco-nigrous or black, with crenate or lacinulate inflexed thalline margin, within usually yellow. Spores 8, brown, 1 septate, fusiform-elliptical, ·02 to ·023 by ·006 to ·007 mm.

Hab.: S. Queensland.

PARMELIA, Ach.

P. prætervisa, *J. M.* Thallus in size and form, and in its glabrous lower surface, closely resembles *P. latissima*, Fee; but the thallus is slightly firmer, broad, from glauco-albescent to argillaceous, with broad rounded lobes, above in the centre thickly and minutely isidiose (as in *P. latissima f. isidiosa*). Apothecia cup-shaped, when evolute about 8 mm. wide, deeply concave, mouth subentire, disk rubricose-fuscous, back everywhere strongly isidiose-asperate or crowdedly tuberculose. Spores ·014 to ·017 by ·007 to ·008 mm., ovoid. Syn.: *P. tinctorum*, Desp.; *P. perlata, var. prætervisa*, J. M.

Hab.: Brisbane River, on rocks.

P. latissima, var. ciliata, *Nyl.* Thallus pallid-glaucescent or albescent, margins crispate, and sinuate-lobate, clothed with longish black cilia, surface shining, smooth or sparingly impresso-striate; beneath glabrous, in the centre black and roughened, at the margins spadiceous and smooth. Apothecia not seen.

Hab.: Woolston, *J. F. Shirley.*

P. corrugis, var. sorediata, *J. M.* Thallus (with surface sorediose as in *P. perlata, var. sorediata*, Schaer), whitish or pallid-whitish, lobate, lobes with margins crenate-dentate or crenate-incised, above smooth or sparingly rugulose, beneath pallid, thinly reticulate-rugulose, nude or somewhat sparsely sprinkled with black rhizinæ; apothecia about 6 mm. wide, margins at length crenate or lacero-dentate, disk pallid fuscescent. Spores in small asci ·009 to ·012 x ·005 to ·007 mm. Gonidia ·005 to ·01 in diameter. Syn.: *P. hypotropa, var. sorediata*, J. M. (*P. stuppea*, Tayl; *Cetraria corrugis*, E. Fries; for type only).

Hab.: Brisbane River, on bark.

P. conspersa, var. hypocleistoides, *J. M.* Thallus loosely adherent, wholly subpallid; laciniæ diverse in form, shorter than in the typical form, broadish or in part or wholly narrow; beneath pallid or whitish, almost wholly nude, or furnished with a few distant short and rigid rhizinæ. Spores ·007 to ·012 mm. long.

Hab.: Three-Mile Scrub.

P. perforata, var. ciliata, *Nyl.* Thallus nude beneath, or for the greater part nude, and the margins with black cilia here and there fimbriated, within the margin beneath there is a pallid or fulvescent zone.—*Nyl.* Syn. i., p. 378.

Hab.: Brisbane River.

P. perlata, var. olivaria, *Ach.* Thallus albo-glaucescent or albo-virescent, dilated, lobate; lobes rotundate, subimbricate, usually smaller than in *P. perlata*, with albo-sorediate margins; under surface fuscous-black or black, spadiceous at the margins; apothecia pedicellate, urceolate, badio-fuscous, margin entire and albo-sorediate. Spores 8, colourless, ellipsoid, simple. Syn.: *P. olivetorum*, Ach.; *P. perlata, var. ulophylla*, Wallr.; *P. perlata, var. olivetorum*, Nyl. (*Fide* J. M.)

Hab.: Brisbane River.

PHYSCIA, Nyl.

P. flavicans, var. croceus (Ach.), *Nyl.* Differs from the type only in the colour of the thallus, which is saffron-yellow.—*Nyl.* Syn. i., p. 407.

Hab.: Mount Bauple, on small branches, *J. F. Shirley*.

P. picta, var. isidiophora, *Nyl.* Thallus closely adherent, pallid glaucous, in the central portion crowdedly isidiose, in the margin subopaque, uneven, closely and finely plicate, shortly laciniate; apothecia and spores as in the normal form.

Hab.: Bellenden-Ker.

PYXINE, Fries.

P. cocoes, var. endoxantha, *J. M.* Thallus sulphureous or subaurantio-flavicant within, surface smooth and without soredia; apothecia normal, from their first appearance black.

Hab.: Bellenden-Ker.

DICHONEMA, Nees.

D. sericeum (Sw.), *Mnt.* Thallus pallid or whitish, semiorbicular or subreniform, radiately byssoid-conjoined, above virescent with the exception of the white border, beneath somewhat similarly pallid, or in part virescent. Pallid or uncoloured filaments are simple, and about ·007 mm. in diameter; the scytonemoid filaments are ·021 to ·025 mm.—*Nyl.* Syn. ii., 51.

Hab.: Bellenden-Ker.

PLACODIUM, DC.

***P. galactinum, var. dispersum,** *Pers.* Thallus ecrustaceous, or represented by a few pallid lobate-crenate scale-like laciniæ. Apothecia dispersed, livido-pallescent or subcarneous or nigrescent-pruinose, margin white crenulate; spores ellipsoid, ·014 to ·015 x ·007 to ·009 mm.

Hab.: Mount Perry, on rocks, *J. Keys.*

PSORA, J.M.

P. breviuscula, *J.M.* The scales thickish, appressed or sub-ascending, crenulate, carneo-fuscous, or fuscous, in places bare and exhibiting the hypothalline layer; apothecia when young with margin concolorous with thallus, and flat disk, afterwards with margin obscured, and disk subconvex; spores simple, resembling those of *P. parvifolia.* Syn.: *P. foliata, var. atro-virens,* C.K. *P. parvifolia,* Tuck.

Hab.: Rosewood Scrub, on bark.

LECANORA, Nyl.

L. granifera, *Ach.* (non Krph). Thallus thin, granulose, obscurely brownish or greenish, granules minute, their summits paler and sorediate; apothecia when young with concave disk and thickish pallid margin, when mature to 1 mm. with margin thin or obliterate and disk from carneo-pallid to nigro-fuscous to black, becoming convex; spores simple, hyaline, ·012 to ·014 x ·006 to ·009 mm., ovoid or ellipsoid.

Hab.: Three-mile Scrub, Brisbane, *J. F. Shirley.*

L. cæsio-rubella, *Ach.* Thallus from cinereous or cinereo-cæsious to cinereo-virescent, minutely sub-areolate or sub-granulose; apothecia small, numerous, occasionally in contact, margin thick, when young tumid and entire, when old lacero-erose, cinereous or faintly cæsious; disk plane or concave, carneous or roseate; spores simple, hyaline. Syn.: *L. byssiplaca,* Fee; *L. pallidoflava,* Fee; *L. farinacea,* Fee.

Hab.: Hill End and Goodna, on bark, *J. F. Shirley.*

L. subfusca, var. compacta, *J. M.* Apothecia compactly crowded and concealing the thallus, by mutual pressure angulose, and at length partly confluent, ·5 to 1·5 mm. wide, in the central parts largest. *J.M.* Rev. Lich. Fee, 38.

Hab.: Bundaberg, on bark, *J. Keys.*

L. subfusca, v. allophana, *Ach.* Thallus whitish or albido-cinereent, determinate, or sub-determinate, thin, unequal, rugose, or granulose-corrugate; apothecia plane or convex, rufo-fuscous, subrubricoso-fuscous, fuscous-black or black, thalline margin at first entire, then crenate and flexuose; paraphyses slender, not distinct. *Leighton* Lich. Fl. Gt. Brit., p. 200. Syn.: *L. subfusca v. horiza*, Fee.

Hab.: Mount Perry, on bark, *J. Keys.*

L. (Rinodina) minutula, *J. M.* Thallus thin, rimose-areolate, or diffracto-areolate, at first sub-continuous and smooth; areolæ plane, angulose, cinereo-albid; apothecia small, ·2 to ·3 mm., closely innate-appressed, blackish, girdled with a thin, albescent, entire margin; lamina and hypothecium hyaline, epithecium brown, paraphyses above clavate, in all parts constricto-articulate and subfuscous; asci oblong-ovoid; spores, 8, 2-locular, brown, ·017 x ·008 to ·009 mm.

Hab.: Mount Perry, on rocks, with *Lecidea impressa*, Krph, *J. Keys.*

URCEOLARIA (Ach.), *Nyl.*

Thallus crustaceous; apothecia urceolate; spores 8, fuscous, septate, murali-divided; spermatia cylindrical.—*Leighton*, p. 234.

U. actinostoma, *Schaer.* Thallus cinereo-plumbeous, lead-coloured, or discoloured, crustaceous, usually thin, arising from a black hypothallus by which it is often irregularly and indefinitely bordered. areolate, areolæ when sterile flat or occasionally concave, when fertile convex; apothecia usually one, or rarely two in each areola, immersed, urceolate, circumciss, the mouth blackened and rayed; spores 8, murally divided, 1-3 cellules in each of the (usually) 6 series.

Hab.: Helidon, on rocks, *J. F. Shirley.*

PERTUSARIA, DC.

P. (Leioplacæ) meridionalis, var. xanthostoma, *J. M.* Thallus moderate, sublimitate, distinctly flavicant, rugose-unequal or rugose-granulose, at length rimose; thalline protuberances irregular and obtusely gibbose-verrucose; apothecia 2 to 3 or more included in each verruca, the centre of which is occasionally depressed; ostiola hemispherical, emergent, small, obtuse, intensely sulphureous; asci narrow, 8-spored; spores, ·04 to ·06 x ·022 to ·035 mm., thickly coated and smooth.

Hab.: Goodna, on bark, *J. F. Shirley.*

P. (Lecanorastrum) subvaginata, *Nyl.* Thallus thin, virescent-albid, or cinereo-albid, or whitish, continuous, smooth, at length rimose-diffract, and often more or less crowdedly albo-papillose; verrucæ solitary, globular, concolorous, to 1 mm. wide, distinctly constricted below; disk faintly carneous or roseate, as in *P. velata*; spores ellipsoid or oblong-ellipsoid, broadly marginate, ·18 to ·22 x ·07 to ·012 mm., costate. Syn.: *Variolaria globulifera*, Fee; *Variolaria communis*, Fee.

Hab.: Bundaberg, on bark, *J. Keys.*

***P. (Pertusæ) Wulfenii,** *D.C.* Thallus flavescent or pallid-flavescent, or cinereo-flavescent, sub-effuse, cartilagineo-membranaceous, smooth, surface closely plicate, rugose; verrucæ aggregate-difformate; ostiola brownish-black or nigricant, dilated, becoming shapeless, sub-lecanoroid, thalline margin thick, undulato-subcrenate; spores 8, 2-seriate, simple, smooth, colourless.

Hab.: On rocks, Brisbane valley, *J. F. Shirley.*

LECIDEA, Ach.

L. (Biatora) Angolensis, *J. M.* Thallus thinly tartareous, flavicant-cinereous, rimose-areolate, or at length subdiffracto-areolate, bordered by a black-hypothalline line, areolæ slightly convex; apothecia ·17 to ·25 mm. wide, not at all emergent, attaining the surface of the thallus, narrowly and barely visibly nigro-marginate, slightly concave, black or brown-black, nude; lamina ·045 mm. thick above deeply green, elsewhere with the hypothecium hyaline, paraphyses conglutinate, asci cylindrical-obovoid; spores 8, ·008 to ·011 x ·004 to ·0045 mm., oblong-ovoid, simple and hyaline.—*J.M.*, Lich. Af. Occ., p. 35.

Hab.: Bellenden-Ker.

L. (Biatora) leptoloma, *J. M.* Thallus very thin, obsoletely leprose, obscurely cinereous, bordered by a nigro-fuscous hypothalline line; gonidia globose, ·01 mm. wide; apothecia ·5 to ·7 mm., flat, very thin, scarcely prominently margined, margin nigricant, persistent, disk flat or slightly convex, carneo-pallid, opaque and smooth; lamina wholly hyaline, paraphyses conglutinate, asci 8-spored; spores simple, hyaline, ellipsoid or ovoid, ·012 to ·014 x ·006 to ·008 mm. *J. M.*, Lich. Parag., 13.

Hab.: Bellenden-Ker.

***L. (Biatora) exigua,** *Chaub.* Thallus of minute granules which grow together into a thin, cartilagineous, smooth or granulate rugose, finally chinky, pale yellowish or greenish crust, bordered by the black hypothallus; apothecia very minute, ·15 to ·3 mm., adnate, flat, with a thin demiss margin, but soon convex and immarginate, often clustered and confluent, from pale yellowish to brown rufous or black, and the last white pruinose, colourless within; spores ovoid or ellipsoid, ·007 to ·014 x ·005 to ·008 mm. *Tuck*, Syn. ii., 27.

Hab.: Toowoomba, on bark.

L. (Eulecidea) impressa, *Krph.* Thallus thin whitish or pallid or pallid-fuscescent, areolate, areolæ plane, subangular, sublævigate, 1, 2, 3-fruited. Apothecia black, minute, numerous, innate, not confluent, when young, rounded, but when mature, shapeless; spores simple colourless, oval-oblong, ·009 to ·011 by ·003 to ·004 mm.

Hab.: Mt. Perry, on rocks, *J. Keys.*

L. (Patellaria) triseptata, *Hepp.* Thallus, white, opaque, granulose or verrucose-granulose; apothecia brownish-black, opaque, plane, usually aggregated, the thin paler margin blackening, the hypothecium brownish-black above, the paraphyses slender, irregular; spores oblong, 4-locular, ·02 to ·025 x ·007 to ·008 mm.

Hab.: Bellenden-Ker.

L. (Patellaria) tuberculosa, *J. M.* Thallus very variable, crowdedly or sparsely or obsoletely tuberculiferous, or in the same plant partly smooth and partly tuberculiferous, pallid glaucous or albo-virescent, within whitish or sulphur-coloured; apothecia usually fusco-nigrescent, but may vary from livid fuscous to black in the same specimen, junior forms with a tumid shining margin and flat disk, when old subconvex or umbonate; spores solitary, oblong-ellipsoid, 8 to 12 locular, ·08 to ·11 by ·02 to ·03 mm. Syn.: *Lecidea chloritis*, Tuck.

Hab.: Brookfield, on bark.—*Field Naturalists.*

L. (Patellaria) Domingensis, var. inexplicata, (Nyl.), *J. M.* Thallus bright-yellow, or from cinereous to fulvo-flavid; spores shorter and less divided, ·025 to ·01 mm.; 3 to 4 septate, with loculi lentiform, and unicellular.

Hab.: Brookfield and Three-mile Scrub, on bark.

***L. (Bacidia) entodiaphana,** *C. K.* Thallus viridi-cinerascent, very thin, obscurely areolate or continuous, effuse; cortical stratum diaphanous. Apothecia minute, ·4 to ·7 mm., adnate, wholly fuscous, flat, at length convex, within hyaline, bordered by a thin proper margin, which is entire, rather thick, in young forms tumid, pallid brown and persistent; hymenium arising from a thin subhymenial stratum; paraphyses coloured, apices coloured, barely dilatate; spores in elongate clavate asci, attenuate below, 7 to 12 septate, ·05 × ·0035 mm.

Hab.: Brisbane Valley, on bark, common, *J. F. Shirley.*

***L. (Buellia) lauri-cassiæ,** *Fee.* Thallus pale yellowish white, very thin, smooth, continuous or unequal or rimulose areolate, determinate; apothecia numerous, scattered, moderate, plane, marginate, black; margin not at all rarely fuscescent; hypothecium black; spores 8, 2-3-4-6 locular. Syn. *Lecidea triphragmia*, Nyl.

Hab.: On rocks, Brisbane River.

L. (Buellia) modesta (*Krph*), *J. M.* Thallus pallescent or pallid glaucescent, sublævigate, subareolate or almost continuous, and then rugulose or subgranulate, nigro-limitate; apothecia few, scattered, black, plane, marginate, but margins finally obscured; spores brown, ·028 to ·034 by ·013 mm.

Hab.: Mt. Gravatt, on bark, *J. F. Shirley.*

L. (Buellia) parasema, var. rugulosa, *Korb.* Thallus cinereous or pallid glaucescent, continuous or partly diffracto-rimose; areolæ subcontiguous, angulose, superficially rugulose; apothecia black, small, when young plane and prominently margined, finally convex and subimmarginate, disk nude; spores 8, ·015 by ·0075 mm.

Hab.: Mt. Gravatt, on bark, *J. F. Shirley.*

L. (Buellia) parasema, var. vulgata, *Th. Fries.* Thallus as in the type; apothecia ·3 to ·5 mm., numerous, disk nude, black, lamina hyaline, wholly resembling those of B. ventricosa, *J. M.*

Hab.: Brisbane River.

L. (Buellia) parasema, var. saprophila, *Korb.* Thallus non-evolute, indeterminate; apothecia fewer and larger than in the type and closely appressed, in other respects agreeing with the normal form.

Hab.: Cabbage Tree Creek, on dead wood, *J. F. Shirley.*

L. (Buellia) innata, *J. M.* Thallus thinly tartareous, argillaceo-albid, continuous, usually in part superficially rimose-areolate, areolæ contiguous, plane, smooth, opaque; apothecia immersed, black, obsoletely nigro-marginate, ·3 to ·4 mm., disk slightly concave, epithecium and hypothecium black-brown, lamina hyaline; spores ·009 to ·01 x ·0055 to ·0065 mm.

Hab.: Mt. Gravatt, on rocks, *J. F. Shirley.*

L. (Buellia) lactea, *Korb.* Thallus tartareous, the small, flat or finally convex, more or less black-edged, multiangular areolæ, either dispersed upon the conspicuous black hypothallus, or crowded together into a chinky crust, glaucescent and cinerascent; apothecia small, innate-sessile, mostly flat, margin slightly prominent at length flexuous, or the disk papillate and rugose; hypothecium blackish-brown; spores ellipsoid, bilocular, ·009 to ·016 x ·004 to ·008 mm. Syn.: *B. spuria* (*Schaer*), Arn.

Hab.: On rocks, common, *J. F. Shirley.*

CŒNOGONIUM, Ehrenb.

***C. moniliforme,** *Tuck.* Thallus somewhat thickly compact-furfuraceous, very minutely subtomentellose, subinterruptedly unequal, obscurely olivaceo-flavicant; gonidia torulose-concatenate, the articulations globose or ellipsoid, in diameter ·02 to ·025 mm.; apothecia ·2 to ·5 mm., plane, thin, carneo-aurantiacous (or some much paler), margin pallid; spores 8, biseriate in ascus, ·01 to ·012 x ·003 to ·004 mm., at both ends shortly acute, 2-locular, the centre not constricted. *J.M.*, Lich. Parag., p. 18. Syn.: *Biatorinopsis torulosa*, J. M.

Hab.: Toowoomba.

OPEGRAPHA, Ach.

O. grossulina, *J. M.* Thallus whitish or pallid, very thin and almost continuous; apothecia sessile, black, to 1 mm., plane, lecideine, and circular or elongate, obtusely margined, and finally convex and immarginate; spores 8, colourless, ellipsoid, 1-septate, ·022 to ·034 x ·013 to ·018 mm.

Hab.: Brookfield, on bark.—*Field Naturalists.*

MELASPILEA, Nyl.

***M. asteriscus,** *J. M.* Apothecia in the thallus of Parmelias and Peltigeras, sessile, moderately elongate, straightish, in an asterisk of 12 to 20 crowded rays congested, very narrow, vertex almost indistinctly rimigerous, black, nude, in the middle of the asterisk broadly confluent; the asterisk almost regular, ·3 to ·6 mm. wide or smaller; perithecium in section obtusely conical; nucleus conical; asci 8-spored, a lengthy space at the apex incrassate, oblong-ovoid; spores 4 to 8, ·009 x ·0035 mm., 2-locular, hyaline to fuscous.

Hab.: In thallus of *P. prætervisa*, Rosewood.

GRAPHINA, J. M.

G. simulans *(Leigh)*, *J. M.* Thallus whitish-glaucescent, smooth, thin, slightly shining; lirellæ crowded in moderate masses, the groups somewhat scattered, radiate, gyrate or contorted, subinnate, shortly furcate-ramose, surrounded by a whitish, erect, thin, thalline margin; epithecium gaping, flat, red; perithecium none; spores 8, colourless, small, oblong, 5-cellular, with cellules 2 to 3 nucleolate, almost muralicellulose.

Hab.: Bellenden-Ker.

PHÆOGRAPHINA, J. M.

P. cæsio-pruinosa, *J. M.* Disk exposed, often broad and plane, immersed, when young more or less cæsio-pruinose, gradually becoming nude and brown, bordered on both sides by the black emergent proper margin (in which it differs from *P. scalpturata*); perithecium thin, pallid, above olivaceo-nigricant; hypothecium hyaline or with obscure black line at base; spores 2 to 3, or more frequently 4 to 8, hyaline to fuscous, ·09 to ·14 x ·022 to ·035 mm., cylindrico-ellipsoid, at both ends obtuse, 20 to 26 locular, loculi 4 to 7 locellate. Syn.: *Leiogramma lateritium*, Eschw.

Hab.: Bellenden-Ker.

ARTHONIA, Ach.

A. gregaria, var. adspersa *(Mnt.) Nyl.* Thallus thin, white, greyish, or rose-coloured, indeterminate. Apothecia violet-brown, obtuse or sublobate, the margin white-pruinose. Spores ·02 to ·023 x ·007 to ·008 mm.—*Willey*, p. 8. Syn.: *Leiogramma tenella*, Eschw.; *Conioloma coccineum*, Eschw.

Hab.: Bellenden-Ker.

A. subgyrosa, *Nyl.* Thallus thin, white. Apothecia depressed, rounded or difform, somewhat gyrose-insculpted or rugose and torn, within dark. Spores oblong-ovoid, 4-locular, ·015 x ·006 mm.—*Willey*, p. 37.

Hab.: Bellenden-Ker.

GLYPHIS, Ach.

G. favulosa, var. intermedia, *J. M.* Thallus fulvo-fuscescent or olivaceous, smooth; verrucæ distinctly larger and more crowded with lirellæ than in the type, margin at length in part whitish, and between the lirellæ glauco-pruinose or albido-pruinose.—*J. Mull.*, Lich. Fee., p. 61. Syn.: *G. cicatricosa*, Eschw.

Hab.: Bellenden-Ker.

STRIGULA.

S. Glaziovii, *J. M.* Plagulæ ·3 to 1·3 mm. wide, orbicular, subregular, very thin and flat, silvery-grey, opaque, clothed with a grey appressed down, in the periphery greenish, lobules radiating and linear; gonidia phyllactideal; apothecia unknown.

Hab.: Botanic Gardens, on magnolia leaves.

CAMPYLOTHELIUM, J. M.

Thallus crustaceous, gonidia chroolepoid, concatenate; apothecia pyrenocarpous, scattered in the thallus, apex obliquely ostiolate; pseudoparaphyses slender, connected; spores hyaline, parenchymatous.

C. nitidum, *J. M.*

Hab.: Bellenden-Ker.

C. defossum, *J. M.*

Hab.: Goodna, *J. F. Shirley.*

TRYPETHELIUM.

T. Eleuteriæ, var. citrinum, *J. M.* Differs from the type in the verrucæ becoming finally decorticate, when they appear intensely flavescent.

Hab.: Brookfield and North Pine River, (*J. F. Shirley*), on bark.

TOMASELLIA, Mass.

T. aciculifera, *J. M.* Thallus pallid, thin, smooth, opaque, margin effuse. Apothecia compound, immersed in densely connate, convex, gibbose pustules, ·5 to ·7 mm. wide, perithecium in section with axis straight, leading to a straight and erect ostiolum, base wanting. Spores hyaline, multilocular, acicular, loculi cylindrical, ·06 x ·0025 mm.—*J. M.*, Pyr. Cub., p. 398 (in part).

Hab.: Bellenden-Ker.

PYRENULA, Fee.

P. mamillana (Ach.), *Trev.* Thallus membranaceous, smooth, pale fuscous-green, black-bordered. Apothecia ·6 to ·7 mm. fairly deplanate, in the centre obtusely umbonate and often plicatulate, base subplane and evolute; spores 1-serial, ·017 to ·02 x ·007 to ·008 mm.—*J. M.*, Lich. Cub., p. 411 (in part). Syn.: *P. Cinchonæ*, Fee; *P. nitida*, Fee; *Verrucaria santensis*, Tuck.

Hab.: Bellenden-Ker.

P. Warmingii, *J. M.* Thallus thin, continuous, smooth, shining, orange-coloured; apothecia scattered or confluent in two and threes, thinly thalline clothed; perithecium black, 1-ostiolate, ostiola black, erect; spores brown, transversely divided, 4-locular, loculi lenticular, ·015 to ·02 x ·006 to ·008 mm.

Hab.: Brisbane R., on bark.

P. mastophora (*Nyl.*), *J. M.* Thallus thin, sublimitate, smoothish, fulvescent-pallid, cartilagineo-corticate; verrucæ 1-fruited, irregularly confluent, depresso-hemispherical, thalline clothed, concolorous; vertex nigro-denudate, flattish, shining; perithecium globose, black, apex shortly emergent; spores brown, 4-locular, ·028 to ·036 x ·01 to ·012 mm.

Hab.: Brookfield, on bark, *Field Naturalists.*

P. adacta, *Fee.* Thallus fulvescent-pallid, widespread, thin, smooth; apothecia scattered, mammiferous, thalline prominences 1·2 to 1·5 mm. wide, hemispherical, apex black, hemispherical, in the centre of the vertex minutely foveolate, broadly denudate and shining, below with a thick concolorous thalline layer overspread; perithecium ovoid or subglobose, complete, thin and very attenuate below; spores ·035 to ·05 x ·015 to ·023 mm., oblong ellipsoid, equally 4-locular.

Hab.: Brookfield, on bark, *Field Naturalists.*

ANTHRACOTHECIUM, *J. M.*

A. Thwaitesii, *J. M.* A most variable lichen in magnitude and form, and in the nude or more or less velate surface of the apothecia; perithecium in middle height more or less patenti-angulose, base thicker or thinner, flattish or very convex; spores ·045 to ·15 x ·02 to ·045 mm., often in the same apothecium very unequal, 6 to 8 in ascus, or occasionally 3 to 5, the others abortive.—*J. Mull.*, Pyr., Cub., p. 414. Syn.: *Verrucaria Thwaitesii*, Leight.; *V. Pyrinoica*, M. and F.

Hab.: Brookfield, on bark, *Field Naturalists.*

A. amphitropum, *J. M.* Thallus argillaceo-pallid or flavescenti-pallid, thin, smooth, nigro-limitate; apothecia in verrucæ 1 to 1·2 mm. wide, solitary or here and there seriately or irregularly concrete, con-

colorous with the thallus; perithecium fusco-nigrous, complete, slightly depresso-globose, when evolute ·7 mm. in height, and slightly deeper in its immersed portion, nude part broadly pyramidal-hemispherical, almost depresso-hemispherical, vertex obsoletely mamillate, and the mouth minutely umbilicate; paraphyses capillary; asci narrow, 8-spored; spores brown, ·04 to ·055 x ·016 to ·025 mm., 2 to 4 locellate.

Hab.: Brookfield, *Field Naturalists.*

A. pyrenuloides (Mnt.), *J. M.* Thallus olive or olive-brown, waxy, continuous, smooth, more or less polished; perithecia black, large, immersed in or invested by the thallus, globoso-hemispherical, aggregate, base rounded or more or less truncate-deplanate; ostiolum black, more or less denudate; spores 4-8, fuscous, multilocular in 12 or more series of many locellæ each; hym. gel. and asci slightly vinous red with iodine. Syn.: *V. pyrenuloides*, Leight.; *Trypethelium pyrenuloides*, Mnt.

Hab.: Helidon, on bark, *J. F. Shirley.*

MICROTHELIA.

Fruit pyrenocarpous, simple, 1-ostiolate, ostiola straight and erect, spores brown, transversely divided, loculi not lenticular.

M. miculiformis, *J. M.* Thallus white or pallid, thin, continuous, smooth, shining, nigro-limitate; apothecia ·4 to ·45 mm. wide, depresso-hemispherical, black, base persistently thalline clothed, and above this by the thallus discoloured, about the base rugulose dilatate; perithecium dimidiate, very thick; spores in 1 to 2 series in ascus, 8, usually brown, ·016 to ·017 x ·006 to ·007 mm., oblong-ovoid, in the centre constricted, 2-locular.

Hab.: Brookfield, on bark.—*Field Naturalists.*

Order FUNGI.

Description wanting at page 35 of my last Bulletin.

Glæosporium pestiferum, *Cke. and Mass.* Pustules gregarious, subcuticular, small, discoid, convex, rosy. Conidia oozing out from pink nodules resembling a small *Tubercularia*, cylindrical, rounded at the ends, straight, continuous granula within, hyaline, 14-15 x 3-4 μ. *Grev.* xix., 61.

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*Specific characters not given in Botany Bulletin No. 2.

By Authority: James C. Beal, Government Printer, Brisbane.

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BULLETIN No. 13.

DECEMBER, 1891.

BOTANY BULLETIN No. IV.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

(WITH PLATES.)

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

BY AUTHORITY: JAMES C. BEAL, GOVERNMENT PRINTER, WILLIAM STREET.

1891.

NOTICE.

Again the opportunity is taken of thanking those persons who have rendered a service to botany in one or other of its branches by forwarding, to the author of the bulletins, specimens of the indigenous plants of their districts, as such have come into bloom; by these means our Flora is being gradually worked up, and a knowledge of our plants diffused.

As fragmentary, imperfect specimens are often sent for determination, one may suppose the senders are ignorant of what is required: the following definition is therefore given:—

A botanic specimen is such a portion of a plant as may enable a botanist to determine its name, &c. Thus, of a tree or shrub, a shoot, say six or nine inches long, bearing leaves, flowers, and fruit, if possible, will be sufficient. Of herbs, when small, an entire plant should be sent, collected when in flower; of herbs of a large size, a portion of the lower (radical) leaves, and also a portion of the top, in flower or seed. All specimens should represent the typical form—not an abnormal or irregular growth, except to show such growth. After gathering, place the specimen between sheets of paper (old newspaper), and put the whole under a slight pressure; these papers should be changed for dry sheets every day for three or four days, when, if the specimens are not of a succulent nature, they will be in a fit state to forward by post, the cost of which will be 2d. per $\frac{1}{4}$-lb. from any part of the colony to Brisbane.

F.M.B.

December, 1891.

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BOTANY:

CONTRIBUTIONS TO QUEENSLAND FLORA.

Order GUTTIFERÆ.

GARCINIA, Linn.

G. Warrenii, *F. v. M.*, Vict. Nat. Nov. 1891. (After Dr. Warren, of the Sydney University.) A glabrous tree of about 40 ft., the branchlets robust, angular. Leaves 3 to 5. in. long, of firm texture, mostly lanceolate-ovate, the primary lateral veins numerous, and somewhat prominent, particularly on the underside; petioles short. Flowers rather large, crowded into axillary clusters, the pedicels short and thick. Sepals almost semiorbicular, the inner only about $\frac{1}{8}$-in. long, though exceeding the outer. Petals 4, pale, obovate or verging somewhat into an orbicular form, incurved, with broad base, sessile, seldom longer than 4 lines, in front slightly and irregularly denticulate, staminal mass of the male flowers divided almost to the base into 4 ovate lobes, about half as long as the petals, and to which they somewhat adhere. Anthers almost quadrivalvular, extremely numerous, densely covering the inner side of the lobes to near the base, pale, partly on very short filaments, partly sessile, their cells divergent, widely dehiscent; rudimentary style rather thick, angular, about $\frac{1}{8}$-in. long, with a convex stigma. Female flowers and fruit not yet seen. The staminal arrangement resembles somewhat *G. cornea* and *G. merguensis*, and the leaves *G. neglecta*, Vieillard, and the venulation of them is much more prominent than in *G. subtilinervis*. —*F. v. M. l.c.*

Hab.: Near the Coen River, *Stephen Johnson*.

This is the second species of the genus which has been met with in Queensland. It is to be hoped that the fruit will soon be made known and found equally useful with the Bellenden-Ker species, *G. Mestoni*.

Order TILIACEÆ.

Tribe ELÆOCARPEÆ.

ELÆOCARPUS, Linn.

E. arnhemicus, *F. v. M. E. obovatus*, var. (?) *foveolatus*, Benth. in vol. i. 281, Fl. Austr. A small tree, height about 30 ft., diameter of trunk about 8 in., with a whitish grey smooth bark; wood white, with a closely interlocked grain. The bark of the smaller branches or branchlets dark-brown and closely dotted with lenticels. Leaves oblong or broadly and obtusely ovate, $1\frac{1}{2}$ to 3 in. long, $1\frac{1}{2}$ to $1\frac{3}{4}$ in. broad, obscurely crenate; the primary veins with glandular pits in their axils. Racemes solitary or in pairs, about 1 in. long (no flowers sent with Mr. Jacobson's specimens). Drupe bright-blue, ovoid, 6 or 7 lines long, 4 or 5 lines diameter; sarcocarp of an agreeable acid flavour, putamen very prominently tuberculate; 1-seeded.

Hab.: Near Musgrave Electric Telegraph Station, Cape York Peninsula, *Geo. Jacobson*.

Order CELASTRINEÆ.

Tribe HIPPOCRATEÆ.

SIPHONODON, Griff.

S. pendulum (n. sp.) Weeping Ivorywood tree. A tree with a thick, rough, corky outer bark on the trunk, the wood close-grained, when fresh yellowish; the branches dividing at their extremities into numerous long, slender, thong-like, drooping branchlets. Leaves usually falcate, about 5 in. long and seldom exceeding 1 in. in breadth, obtuse or at times minutely apiculate, the texture thin, almost membranous; primary veins distant and very oblique, the veinlets undulately anastomosing, but not prominent. Peduncles about 1 in. long, bearing a few flowers at the end. (Flowers not forwarded.) Fruit nearly globose, $2\frac{1}{2}$ by 2 in., on pedicels of about 1 in., spuriously 5-celled. Nuts irregularly ovate, about 5 lines long and 3 or 4 lines broad, with a smooth but somewhat lacunose face, and when dry freer from the surrounding mealy substance than is the case in *S. australe*. Putamen hard and thick. Testa of seed brown.

Hab.: Musgrave Electric Telegraph Station, Cape York Peninsula, *Geo. Jacobson*—who says that the fruit is edible, and resembles in taste the common white guava, which it is not unlike in size and appearance.

This new species differs from *S. australe* in the texture and form of leaves, the pendulous branches, and size of fruit, and in the figure of its wood. I think it may prove identical with one growing in the scrubs of Tringilburra Creek, of which I picked up fruit, but could not identify the tree from which they had fallen.

Order RHAMNEÆ.

CRYPTANDRA, Sm.

Section WICHUREA.

C. longistaminea, *F. v. M.*, Fragm. iii. 65; *Benth.* in Fl. Austr. i. 443. A much-branched unarmed shrub of 2 or 3 ft., the smaller branches minutely hoary-tomentose. Leaves ovate or oblong, obtuse, 1 to 2 lines long, the margins recurved or revolute, glabrous above, minutely silky-tomentose underneath or almost glabrous. Flowers numerous, crowded on the smaller branches, but not quite sessile. Brown bracts imbricate round the base of the calyx-tube. Calyx about 2 lines long, minutely silky outside, divided below the middle into spreading lobes. Petals on slender claws, at first enclosing the stamens, but reflexed after the calyx opens, leaving the stamens erect and apparently exserted. Disk annular, glabrous or very minutely tomentose, quite distinct from the ovary. Ovary sessile or slightly immersed in the disk. Style very shortly 3-lobed.—*Benth. l.c.*

Hab.: Condamine, *C. H. Hartmann;* Gladfield, *C. J. Gwyther.*

Order SAPINDACEÆ.

Suborder SAPINDEÆ.

NEPHELIUM, Linn.

N. Lautereriana (n. sp.) (Name in honour of Dr. J. Lauterer, the energetic member of the Field Naturalists' section of the Royal Society of Queensland.) A tall erect tree with umbrageous head; trunk attaining a diameter of $1\frac{1}{2}$ to 2 ft., bark smoothish. Leaves alternate, pinnate, glossy, narrow-lanceolate in outline, the young growth more

or less viscid and of a bright purplish red; leaflets very irregular, alternate, about 10 on adult trees, linear-lanceolate, about 5 in. long, 1 in. wide, larger on the young trees; margins entire or obscurely toothed in the upper half; petiolule very short and enlarged where it joins the rhachis; midrib prominent, the lateral veins numerous, almost horizontal from the midrib, with small pits at the axils. Flowers not seen. Capsule glabrous, depressed, prominently stipitate, attaining to a diameter of 1 in., of 3 rounded lobes, which are by abortion sometimes reduced to 1 or 2, glabrous inside except for a small dense tuft of white hairs immediately below where the ovules are attached. Seeds compressed smooth, angular, testa thin, light-brown coloured, 3 or 4 lines broad; entirely concealed in a thick fleshy arillus of an amber colour, very juicy and of sharp acid flavour. The nearest Australian ally to the above is probably *N. leiocarpum*.

Hab.: Eudlo Scrubs, *Field Naturalists*, Nov. 1891.

The sharp, acid, thick arillus closely resembles that in the fruit of *Diploglottis*, and might be used in a similar manner. Doubtless an excellent and palatable jelly might be made from it.

Suborder DODONÆÆ.

DODONÆA, Linn.

D. Hansenii, *F. v. M.*, Vict. Nat. 1891. (Name in honour of Lars Hansen, of Huesbye.) A shrub of about 12 ft. high, glabrous, hardly viscid. Leaves attaining the length of 2 in., slightly shining, on rather conspicuous petioles, chartaceous, broadly and somewhat bluntly lanceolate, but more gradually narrowed into the base than into the apex, subtle-venulated. Flowers unknown. Racemes when fruiting below the leaves corymbose, few-flowered or reduced to 3 or 2 flowers; pedicels rather long. Sepals early deciduous. Capsule usually 4-celled, its capsular portion hardly as long as broad, its wing-appendages ascendingly divergent, venulous, and from 4 to nearly 6 lines broad, considerably broader than high, rounded-blunt at the upper end, ceasing before the base and before the middle summit of the valves; dissepiments seceding from the axis, closing permanently the carpels. Young seeds longer than broad, almost truncate and also turgescent around the hilum. Ripe seed not obtained.—*F. v. M. l.c.*

Hab.: Stewart's River, *Stephen Johnson*.

Among the few species with fruit dissepiments seceding from the axis this comes nearest to *D. platyptera*, but the leaves are of larger size, of darker green, of thinner texture and not of conspicuously glandular punctuation; further, the appendages of the fruit are perceptibly larger, and turn almost diagonally upwards, while those of *D. platyptera* remain nearly at a level with the vertex of the cells. The flowers and mature seeds may also yet show specific differences. From *D. pachyneura* our new plant is also distinguished by much larger leaves, with fainter and more divergent venulation, also by the greater extension of the fruit-appendages. The shape of the fruit is much like that of *D. macrozyga* and *D. megazyga*, but its dehiscence, as well as the foliage, are very different. The leaves resemble those of *D. lanceolata* and *D. triquetra*.—*F. v. M. l.c.*

D. truncatiales, *F. v. M.*, Fragm. ii. 143, and Pl. Vict. i. 226; Fl. Austr. i. 479. A tall shrub, glabrous, scarcely viscid, the younger branches acutely angular. Leaves narrow-lanceolate or linear, rather acute, 2 to 4 or 5 in. long, narrowed into a short petiole, entire or obscurely sinuate-toothed, the lateral veins little conspicuous. Racemes and flowers of *D. viscosa*. Sepals ovate, usually broad, and nearly as long as the anthers. Capsule 4 or rarely 3-lobed, flat at the top, the

wings oblong, very diverging, not extending to the base of the carpels. Dissepiments remaining attached to the axis, or occasionally deciduous.

Hab.: Mitchell's Pinch, Leichhardt District.

Order LEGUMINOSÆ.

Tribe PODALYRIEÆ.

PULTENÆA, Sm.

Section Eupultenæa.

P. paleacea, *Willd.*, Sp. Pl. ii. 506; Fl. Austr. ii. 115. A shrub, with slender diffuse or divaricate branches, silky-pubescent when young. Leaves linear, with fine straight or recurved points and revolute margins, ½ to over 1 in. long, glabrous above, pale and usually silky-hairy underneath. Stipules appressed, often 2 lines long, or more. Flowers in dense but not large terminal heads, sessile within the last leaves. Bracts imbricate, glabrous, scarcely ciliate, completely covering the calyxes, the inner ones 3 or 4 lines long. Bracteoles inserted on the calyx-tube, concave, carinate. Calyx silky-hairy, about 3 lines long, the lobes lanceolate, much shorter than the tube, the 2 upper ones united above the middle. Standard nearly twice as long as the calyx; lower petals shorter. Ovary villous, gradually tapering into a long style. Pod compressed, silky, longer than the calyx, and tapering into the long persistent silky base of the style.—Fl. Austr. l.c.

Hab.: Maroochie, Wellington Point, and other places along the coast.

Order MYRTACEÆ.

Tribe LEPTOSPERMÆ.

MELALEUCA, Linn.

Series Spicifloræ.

M. lasiandra, *F. v. M.*, Fragm. iii. 115; *Benth.*, Fl. Austr. iii. 143. *A small tree, 40 to 45 ft. high, with a stem diameter of* 14 *or* 15 *in., bark grey, fibrous, lamellar but hard and closely compact,* the young foliage silvery-silky, becoming glabrous and glaucous with age. Leaves alternate, often vertical, from elliptical-lanceolate to almost linear, acute or acuminate, narrowed at the base, rigid, thick, 1 to 2 in. long, *attaining* 3 *or* 4 *in. in length and a breadth of* 4 *lines,* obscurely 3 or 5-nerved, *nerves rather prominent.* Flowers small, more or less distant, forming irregularly interrupted *slender* spikes 2½ in. long, at first terminal, but the axis soon growing out into a leafy shoot, the rhachis and calyxes softly pubescent or villous. Calyx-tube ovoid, about 1 line long; lobes ovate, about half as long as the tube. Petals not much longer than the calyx-lobes, often pubescent. Staminal bundles about 3 lines long, the claws short, more or less pubescent outside, irregularly divided, each into 12 to 20 filaments, of which some are often free almost to the base; anthers small. Ovules exceedingly numerous, covering a peltate placenta; style pubescent at the base; stigma small. Fruiting-calyx not much enlarged, crowned by the persistent lobes. Seeds not winged.—*Benth. l.c.* (except the italics, which apply to the Queensland tree).

Hab.: Musgrave, Cape York Peninsula, *Geo. Jacobson*—who speaks of it as "a real good useful timber, durable either in or out of the ground." I think there can be no doubt as to this being identical with the tree found by Baron Mueller on the Upper Victoria and Fitzmaurice Rivers in the Northern Territory of South Australia.

Order **RUBIACEÆ.**

Tribe SPERMACOCEÆ.

SPERMACOCE, Linn.

S. pogostoma, var. hispida (n. f.) Plant clothed with short somewhat stiff white hairs. Stems procumbent, with erect branches from 6 to 12 in. high. Leaves linear to linear-lanceolate, ¾ to 1½ in. long, the short almost pungent point often recurved, margins revolute. Stipular sheath and bristles of medium length. Calyx-lobes lanceolate with bristle-like points. Corolla pubescent, about 2 lines long, white not becoming much discoloured in drying, the tube and lobes of about equal length, densely bearded at the orifice of the tube, the lobes with inflexed tips. Anthers small, ovate, sessile at the base of the tube. No ripe capsules on the specimens examined.

Hab.: Musgrave Telegraph Station, Cape York Peninsula, *Geo. Jacobson.*

Order **COMPOSITÆ.**

Tribe INULOIDEÆ.

HELICHRYSUM, Gærtn.

Section Ozothamnus.

H. cinereum, *F. v. M.* in Fl. Austr. iii. 629. (*Chrysocoma cinerea,* Labill., Pl. Nov. Holl. ii. 39, t. 182.) An erect much-branched shrub of several feet, the branches tomentose. Leaves linear, obtuse, rarely exceeding ½-in., with revolute margins, not decurrent, glabrous above, tomentose underneath, sometimes very narrow, sometimes thick and rather broad. Flower-heads small and numerous, in rather dense terminal corymbs. Involucre at first ovoid, at length broadly turbinate, about 3 lines long, the bracts rather numerous, appressed, often almost acute, the innermost without any or with minute scarcely spreading white tips. Florets 15 to 20 or rather more, a very few of the outer ones female. Achenes papillose. Pappus-bristles serrulate, slightly thickened upwards.—*F. v. M. l.c.*

Hab.: Cunningham's Gap, Main Range, *C. J. Gwyther.*

Tribe HELIANTHOIDEÆ.

GLOSSOGYNE, Cass.

G. orthochæta, *F. v. M.*, Viet. Nat. Nov. 1891. Stems attaining the height of 2 ft., somewhat woody at the base, few-branched. Leaves crowded along the lower part of the branches and stem, about 3 in. long, the lower often reflexed and some of these undivided, the others pinnately divided, their segments distant, narrow-linear, much pointed, the uppermost leaves few remote, undivided, linear. Flower-heads solitarily terminating elongated, simple, peduncle-like branches. Involucral bracts rather numerous, somewhat scarious towards the summit and thus far soon reflexed; floral bracts bluntish, receptacle rather ample. (Florets not sent with specimens.) Achenes numerous, 2 or 3 lines long, compressed, narrow, blackish, streaked; awns 2, erect, slightly retrohispidulous, often only barbed at the point. The bracts almost concealing the achenes, gives to this plant a distinctive character to *G. tenuifolia;* the leaves are also longer and the segments narrower.—*F. v. M. l.c.*

Hab.: Near the South Coen River, *Stephen Johnson.*

Tribe CICHORIACEÆ.

TARAXACUM, Juss.

Involucre campanulate or oblong, bracts in 2 rows; the innermost linear and parallel, the outer shorter, spreading or reflexed. Receptacle without scales, convex, dotted. Florets all ligulate. Achenes round or angular, wingless, with a long beak, which is very slender, brittle, cylindrical, and furnished at the base with toothlike tubercles. Pappus hairlike, very soft, in many rows.

T. Dens-leonis, *Desf.; DC.*, Prod. vii. 145; *Benth.* in Fl. Austr. iii. 680. The European Dandelion. A perennial with a bitter taproot. Leaves radical, varying from linear-lanceolate and almost entire to deeply pinnatifid, the lobes often curved downwards. Scapes leafless, rarely exceeding 6 in., bearing a single rather large flower-head. Involucre of several nearly equal bracts with some smaller outer imbricate ones often recurved. Florets yellow, all ligulate. Achenes scarcely compressed, striate, tapering into a slender beak two or three times their own length, and bearing a pappus of numerous simple hairs.—*Benth. l.c.*

Hab.: Toowoomba Swamp.

This plant has become naturalised on the Darling Downs. Of the roots of this plant, which have long been used in medicine, Dr. Lindley says:—"The infusion, decoction, and extract of the root are tonic, and, in large doses, aperient. In some cases it acts as a diuretic. In the hepatic complaints of persons long resident in hot climates it often affords very marked relief."—Flora Medica.

TRAGOPOGON, Linn.

Involucre cylindric or narrowly campanulate; bracts 1-seriate, longer or shorter than the florets, herbaceous, acuminate, bases sometimes connate, no outer ones. Receptacle flat or convex, pitted, margins of the pits often cartilaginous. Achenes slender, terete, 5-angled, 5 to 10-ribbed, ribs smooth or muricate, basal areole broad, concave, inner usually with a slender beak, pappus-hairs numerous, 1-seriate, feathery, connate into a basal ring, 5 to 10 longer than the rest, with simple (not feather) tips, those of the outer achenes often fewer, subpaleaceous, free at the base, simple or feathery below. Biennial or perennial milky-juiced herbs. Leaves alternate, stem-clasping, narrow, quite entire. Heads terminal, long-peduncled, large, homogamous, yellow, blue, or purple; florets all ligulate.

T. porrifolium, *Linn.; DC.*, Prod. vii. 113; *Benth.* in Fl. Austr. iii. 680. The Salsify or Salsafy of Europe. A glabrous biennial or perennial of 1 to 2 ft., with a taproot. Radical and lower leaves long and grass-like, entire, shortly dilated and sheathing at the base, the upper ones shorter and broader. Peduncles long, thickened at the summit, each with a single head of purple florets. Involucre of 8 to 12 nearly equal bracts longer than the florets. Achenes narrowed into a long beak, bearing a pappus of feathery bristles.

Hab.: This wide-spread plant has become naturalised on the Darling Downs.

Order SAPOTACEÆ.

LUCUMA, Juss.

L. Unmackiana (n. sp.) (After the Hon. Theodore Unmack.) Tree of medium size, bark hard, dark-coloured, about $\frac{1}{4}$-in. thick, deeply fissured in straight lines about $\frac{1}{2}$-in. apart. Wood of a reddish

colour, tough and elastic, the light-coloured sapwood very scanty. Branchlets, young growth, and underside of foliage more or less densely clothed with a hoary or rusty tomentum. Leaves coriaceous, broadly ovate, tapering to a petiole of 2 or 3 lines, apex abruptly acuminate, 2 to 3 in. long, 1½ to 2 in. broad, primary lateral nerves parallel, rather close and regular, and with the smaller reticulations prominent on the upper face. Calyx-segments 4, about 3 lines long, ovate-lanceolate, 2 outer ones silky-hairy on the outer side, 2 inner ones with broad scarious margins, the centre or part exposed in the bud silky like the outer segments, all glabrous on the inner face. Corolla glabrous, urceolate, slightly exceeding the calyx, the 4 blunt lobes shorter than the tube. Stamens 4, attached in the centre of and in a line with the base of the lobes, not exserted; filaments free, scarcely longer than the anthers. Fruit axillary, sessile, oval to pyriform, probably when ripe 2 in. long, densely covered with stiff bristle-hairs of a light-brown colour, which is removed by the slightest touch. Cells 4, sometimes only 1, and seldom 3 maturing seed.

Hab.: Musgrave E. T. Station, Cape York Peninsula, *Geo. Jacobson*. The flowers are described from a few which were found at the base of the fruits, and these latter were also immature, and in all examined the seeds had been destroyed by a grub.

This tree is dedicated to the Hon. the Postmaster-General in acknowledgment of his help rendered to botany at my request, urging upon the men stationed on the Cape York Peninsula Electric Telegraph line (a locality little known to botanists) the desirability of their collecting specimens of the indigenous plants as they might be found in bloom or fruit, and forwarding the same to my office. That the suggestion has already borne fruit will be seen from my recent publications, in which are descriptions of several new plants received from Mr. Geo. Jacobson, to whom I am indebted for the specimens from which the present species is described.

Order CONVOLVULACEÆ.

CALYSTEGIA, R. Br.

C. Soldanella, *Linn.*, Sp. Pl. 226; *Benth.* in Fl. Austr. iv. 431. (So named from the resemblance of the leaves to those of the Primulaceous genus *Soldanella*.) A glabrous perennial with creeping rootstock and prostrate trailing or shortly twining stems. Leaves on rather long petioles, broadly rounded-cordate or kidney-shaped, entire or angular-lobed, rather thick, mostly about 1 in. but sometimes 2 in. diameter. Peduncles 1-flowered, about as long as the leaves. Bracts broadly ovate-cordate, very obtuse, rather shorter than the calyx. Sepals nearly ½-in. long, broad and thin, all very obtuse or the inner ones almost acute. Corolla pink or purplish. Ovary incompletely 2-celled, surrounded by a cup-shaped disk. Stigmatic lobes ovate or oblong, capsule 1-celled.—*Benth. l.c.*

Hab.: On the beach, Little Burleigh Head, *J. F. Shirley*.

This plant, so common to the sea-coast of the southern colonies and other countries, has not previously been observed in Queensland.

Order MYOPORINEÆ.

PHOLIDIA, R. Br.

P. santalina, *F. v. M.*; *Benth.*, Fl. Austr. v. 15; Ic. 54, *F. v. M.*, Myoporinous Plants. An erect glabrous shrub of several feet, slightly glandular-verrucose. Leaves lanceolate, acuminate, entire, narrowed into a rather long petiole, rather thick, 1½ to 2 in. long. Flowers

white, solitary in the axils, on pedicels usually of about ½-in., thickened under the flower. Calyx-segments narrow, acuminate, not 2 lines long, imbricate at the base. Corolla-tube with the cylindrical part nearly as long as the calyx, the upper part broad, about 3 lines long, glabrous inside or nearly so, the lobes scarcely 2 lines long, the 4 upper ones ovate, spreading, with short recurved points or almost obtuse, the 2 uppermost of them ascending, the middle lower lobe twice as broad as the others. Stamens included, didynamous. Ovary glabrous, 2-celled, with 2 ovules in each cell. Drupe succulent, the putamen more or less perfectly 4-celled, with 1 seed in each cell, or more frequently reduced by abortion to 1 or 2 cells and seeds.

Hab.: Walsh River, *T. Barclay-Millar.*

These specimens agree pretty well with the above, but only an imperfect flower and no fruit was forwarded with the shoots. The leaves also possess a rather powerful odour, are very narrow, and fully 3 in. long. These specimens agree better with Baron Mueller's figure on plate 54, l.c., than with the above description taken from Bentham's Flora.

Order VERBENACEÆ.

Tribe CHLOANTHEÆ.

DICRASTYLES, Drumm.

(Name referring to the two prominent branches of style.)

Calyx more or less deeply divided into 5 lobes. Corolla-tube short, the limb of 5 nearly equal short lobes. Stamens 5; anthers without appendages. Ovary 2-celled, with 2 ovules in each cell, laterally attached at or above the middle. Style deeply divided into 2 slender branches or lobes. Fruit small, dry, 4-celled, with 1 seed in each cell. Cottony or woolly undershrubs or small shrubs. Leaves opposite or scattered, undivided. Flowers small, in cymes collected into corymbose panicles, more rarely contracted into dense solitary or corymbose heads. Bracts and bracteoles usually very deciduous.—Fl. Austr. v. 42.

D. Costelloi (n. sp.) An erect undershrub attaining about 18 in. in height, slightly branched. Branches and stems terete, hoary-white with a close tomentum. Leaves scattered, often close, and appearing opposite or in whorls of 3, linear, obtuse, with revolute margins, from ½ to ¾ in. long and 1 line broad, tomentose when young, the older ones rugose. Flowers in small clusters in an elongated terminal spike-like panicle 3 or 4 in. long, only branched at the base; each branch short, and bearing a sessile cluster or head of densely white tomentose flowers. Bracts and bracteoles lanceolate, minute, glabrous inside, the outside densely clothed with the branched hairs of the rest of the plant. Flowers nearly globose, scarcely 2 lines in diameter, on very short pedicels. Calyx divided to near the base, densely covered with branched hairs outside, inside glabrous. Corolla-lobes twice as long as the calyx-lobes, the outside at the base tomentose, the tips glabrous and membranous, the inside glabrous except for a rather large patch of long simple hairs at the base of the lobes. Stamens opposite to and about half the length of the calyx-lobes; filaments glabrous; anthers glabrous, large and deeply lobed. Ovary and entire part of the style densely covered with white, flat, scale-like hairs like those on the other parts of the plant. Style-branches rather long and slender.

Hab.: Near Lake Nash, on the boundary line between Queensland and the Northern Territory of South Australia, *M. Costello.*

In many respects this new species approaches *D. Beveridgei*, F. v. M., Fragm. viii. 50; but no description is there given of the stamens, so one may suppose them to be exserted as in all previously described species. Thus I rely principally upon the difference in indumentum of flowers and length of stamens for distinguishing *D. Costelloi* from others of the genus.

Tribe VITICEÆ.

PREMNA, Linn.

P. Tateana (n. sp.) (After T. Tate, botanic collector of Hann's Expedition.) A tall shrub, bark light-coloured, striated and more or less covered with scattered verrucæ. Leaves glabrous, broad lanceolate, of thin texture, 3 to 5 in. long, some exceeding 2 in. wide in the centre, on slender petioles of ½ to 1½ in., margins entire, primary veins few, about 4 on each side of the prominent midrib, the veinlets fine and numerous between them. Flowers small in terminal trichotomous corymbose panicles, the common peduncle not exceeding 1 in. in length, the branches, branchlets, and calyces clothed with short scabrous hairs. Calyx 5-toothed, scarcely 1 line long, expanding and becoming more or less 2-lipped, ribbed and nearly glabrous under the fruit. Corolla twice as long as the calyx, lobes obtuse, very hairy inside as well as the upper part of the tube. Drupe globular, 3 lines diameter, the putamen prominently verrucose, plainly showing on the dry fruit.

Hab.: Walsh River, *T. Barclay-Millar.*

In many respects this species approaches *P. Dallachyana*, Benth., but no reference is made in the description of that species to the very prominent feature —the verrucose fruit—which would never have escaped detection by Mr. Bentham, in drawing up the diagnosis of that species for the Flora. Its nearest ally would seem to be the Indian species *P. latifolia*, Roxb. The notice given of the leaves of various *Premnas* drying black is not worthy of note, for if dried quickly they retain a green colour, but if allowed to become damp will turn black.

Order LABIATÆ.

Tribe STACHYDEÆ.

LEUCAS, R. Br.

L. zeylanica, *R. Br.* An annual plant branching from the base, 1 to 3 ft. in height, more or less hairy. Leaves 2 or 3 in. long, linear or elliptic-lanceolate, obtuse, subserrate. Whorls many-flowered; bracts few, ciliate, filiform. Calyx ¼ to ⅓ in., obliquely turbinate, glabrous, scabrid or sparsely hispid, teeth erect. Corolla white, pubescent.

Hab.: Kamerunga, *E. Cowley.*

A form of this Indian and Malayan plant is becoming a weed in the cultivation grounds about the Barron River. From the same collector I have also received specimens of *Rungia latior*, Nees., or a closely allied plant belonging to *Acanthaceæ*, which he says has established itself as a weed of cultivation.

Order AMARANTACEÆ.

Tribe AMARANTEÆ.

PTILOTUS, R. Br.

P. Murrayi, *F. v. M.* (After Dr. J. Murray.) A small apparently prostrate branching annual, with slender ascending stems. Leaves oblong, obtuse, about ½-in. long, contracted into a rather long petiole, glabrous as well as the branches. Spikes axillary and terminal, sessile,

oblong or cylindrical, about ½ or ¾ in. long and 3 lines diameter, the pink tips of the perianths just appearing above the white wool. Bracts and bracteoles ovate, obtuse, scarious, glabrous, scarcely about ½-line long. Perianth about 1¼ lines long, with a very short turbinate base, the segments thinly scarious with a red centre, glabrous in the upper half, the lower half covered outside with a long dense intricate white wool. Filaments slender, nearly as long as the perianth, united at the base in a truncate ring, slightly prominent from the perianth-tube; anthers all 5 perfect (or 1 sometimes abortive?). Fruit glabrous, seed obliquely ovate, glossy, dark-brown or black.

Hab.: Monkira, *G. L. Debney.*

Order POLYGONACEÆ.

Tribe RUMICEÆ.

RUMEX, Linn.

R. crispus, *Linn.; Meissn.* in DC. Prod. xiv. 44; *Benth.*, Flora Austr. v. 263. The Curled-leaved Dock. A perennial with a thick rhizome, stems stout, erect, furrowed, 2 to 4 ft. high, branches few. Radical leaves narrow, 6 to 8 or more inches long, much undulate and crisped at the edges, the upper ones smaller, passing gradually into bracts. Stipules sheathing, ragged at the edges. Flower-clusters numerous, and when in fruit much crowded into a long narrow and dense terminal panicle. Inner segments of the fruiting perianth broadly ovate, entire or slightly crenate, with a coloured tubercle on the midrib of one or each segment.

Hab.: Naturalised in Southern Queensland.

R. obtusifolius, *Linn.; Meissn.* in DC. Prod. xiv. 53. The Broad-leaved Dock. Stems 2 or 3 ft. high, erect, slightly branched, round, furrowed, leafy, rough chiefly in the upper part. Radical leaves often very large, blunt at the apex, cordate at the base, on long stalks, the upper ones narrower and more pointed, on shorter stalks, all of a deep-green colour and veiny, the edges crenate and in some degree crisped. Root black, yellowish within. Flower-clusters on the lower part of the branches of the panicle distant and leafy. Outer perianth-segments narrow, nearly as long as the inner ones; the inner ones oblong, obtuse, veiny, subsequently furnished on the margins with from 2 to 4 unequal teeth-like lobes, one or all of them also bearing on the centre near the base an oval coloured tubercle.

Hab.: Naturalised about the Brisbane River.

Order PIPERACEÆ.

PEPEROMIA.

P. enervis, *C. DC. et F. v. M.*, Vict. Nat. Nov. 1891. Rather dwarf, sometimes attaining the height of 1 ft., erect or diffuse, flaccid, glabrous; the upper branches angular. Leaves 6 to 9 lines long, cuneate-obovate, the lateral veins almost obliterated. Flower-spikes solitary or occasionally 2 together, from 1 to 1½ in. long, very slender, mostly terminal, pedunculate; flowers in close proximity, bracts very minute, orbicular, ovary almost entirely emersed, bearing the stigma obliquely. Fruit minute, almost globular, when dry slightly rough.

The above authors place this species near *P. obversa*.—From Vict. Nat. l.c.

Hab.: Bartle Frere, *Stephen Johnson*.

From a specimen kindly sent me of the above plant by Baron Mueller I find it identical with that collected by the Bellenden-Ker Expedition on the rocks at the summit of Bartle Frere, and given in the report as a form of *P. reflexa*.

Order EUPHORBIACEÆ.

Tribe PHYLLANTHEÆ.

ANTIDESMA, Linn.

A. Ghæsembilla, *Gærtn.; Benth.*, Fl. Austr. vi. 85. Black Currant tree of Walsh River. A tree about 20 ft. in height, the young branches, foliage, and inflorescence more or less pubescent or tomentose, the full-grown leaves often glabrous. Leaves on very short petioles, broadly ovate, obovate, or nearly orbicular, very obtuse, rounded or contracted at the base, rather thin, but often shining above, 1½ to 2 or rarely 3 in. long. Male spikes dense in most Indian specimens, less so in the Australian ones, 1 to 2 in. long, the females shorter and looser, both solitary or more frequently several in a terminal panicle. Male flowers sessile or nearly so; perianth deeply divided into 5 or rarely 4 ovate ciliate segments not ½-line long. Stamens varying from 3 to 5, the filaments at least 1 line long. Glands broad, hirsute. Female flowers on very short thick pedicels. Ovary when young pubescent or hirsute, but usually becoming glabrous as it enlarges. Styles short, united at the base, spreading upwards, shortly 2-lobed. Drupes purple or black, not above 3 lines long, usually obliquely ovoid and 1-seeded, but occasionally didymous and 2-seeded. The pulp when ripe is of an agreeable acid flavour, and is eaten raw or converted into jam and jelly.

Hab.: Walsh River, *T. Barclay-Millar*.

Order ORCHIDEÆ.

BULBOPHYLLUM, Thou.

B. bracteatum, *Bail.* Rhizome shortly creeping. Pseudo-bulbs glossy, depressed-globular, 3 or 4 lines diameter, crowded upon the rhizome, wrinkled, and ribbed with from 6 to 8 prominent wavy angles. Leaves solitary, oblanceolate or oblong, recurved, ¾ to 1 in. long, about 3 lines broad in the centre, coriaceous, deep-green; midrib prominent and the 2 or 3 longitudinal veins on each side more or less so. Raceme including the very short peduncle about 2 in. long; bracts on peduncle narrow-linear, those at the top so close as to form an involucre to the base of the raceme; bracts of raceme cordate-acuminate, about 1½ lines long, the upper ones subtending, the flowers numerous, the rhachis and bracts glaucous or hoary-white. Flowers including the pedicels about 3 lines long, mottled of a dull-purple; pedicels striate, scarcely exceeding the subtending bract. Lateral and dorsal segments mottled purple with light-coloured margins, broad-lanceolate, 3-nerved, the 2 inner segments 1-nerved, narrow-linear, shorter than the outer and of a paler colour, erect on each side of the column. Labellum very short, thick and linguiform, buff on the upper, nearly black on the under surface and glossy, claw elastic and as long as the lamina, 3-nerved below the articulation; column very

short; anther-lid rotund, nearly white; pollen-masses golden-yellow (in the flower dissected I found only 2 globular masses).

Hab.: Numminbah, Upper Nerang, *H. Schneider.*

My friend Mr. R. D. Fitzgerald, to whom I sent after making the above description my only specimen that he might figure it in his illustrated monograph of the Australian orchids, writes me that he considers this plant to be identical with his lately described *Adelopetalum bracteatum.* But according to his diagnosis of this new genus (a copy of which he has kindly sent me) the flowers are apetalous, while in my plant it will be seen I have described these organs. With regard to the pollen-masses being reduced to 2, Mr. Bentham mentions this being the case at times in plants of the genus *Bulbophyllum.* As, however, I think the two plants may prove identical, I use the same word for the specific name, leaving botanists to adopt whichever genus they think fit.

Tribe NEOTTIEÆ.

PTEROSTYLIS, R. Br.

P. depauperata, n. sp. Tubers about the size of a small pea, often at a distance of 1½ in. from the leaves. Leaves radical, almost in a rosette, ovate-oblong, on conspicuous petioles, 6 or 8 lines long, 3 or 4 lines broad, prettily veined, the 5 longitudinal ones not more prominent than the others. Scape 1-flowered, about 3 or 4 in. high, with a single empty bract near the middle and another immediately under the flower. Segments of flower all with long filiform points altogether not exceeding 9 lines in length. Labellum shorter than the segments, claw rather short, lamina linear, point rather blunt, entire, recurved, the basal appendage linear, curved and strongly penicillate. Column stained with purple, wings with rather prominent lower lobes.

Hab.: Near Cairns, *C. J. Wild.*

Order PALMÆ.

ARECA, Linn.

A. appendiculata (n. sp.) (Referring to appendage on petals.) Trunk erect, with a diameter of about 1 ft., attaining 20 ft. in height to the base of the crown. Leaves 9 to 12 ft. long, from 12 to 20 forming the crown, sheathing base short, petiole or portion without pinnæ also short, pinnæ alternate or subopposite, from 70 to 80 on each side of rhachis, the longest about 2½ ft. long and 1¼ in. broad, those of the apex confluent at the base, forming a fan-like termination to the leaf; folded upon the rhachis, and tapering to a narrow, oblique, sometimes toothed point, under surface white or grey, dotted with minute scurfy scales, and marked with 2 green lines down the centre; the upper surface deep-green, smooth, the midrib forming a sharp prominent ridge along the centre of the pinna and running out on the lower side an inch or so below the point. Inflorescence from amongst the bases of the leaves. Panicle including short peduncle about 2½ ft. long, broad, densely branched, the ultimate branchlets drooping, flexuose spikes. Bracts 3 or 4, the uppermost one yellowish-white, 2 ft. long and about 6 or 7 in. broad, lanceolate, outer side tomentose, inner glabrous. Flowers numerous, sessile or nearly so. Sepals 3, thin, valvate, about 1 line long, from a broad base tapering to a subulate point. Petals white, about as long again as the sepals, valvate, thick, fleshy, obtuse, bearing upon the inner face a prominent triangular gland or appendage. Stamens 6, the filaments very short, not so long as the rather large deeply sagittate

anthers. Stigmas 3, short, spreading. Ovary 3-celled, maturing but 1 seed, the other 2 abortive. Fruit oval, nearly ½-in. long, but not seen ripe.

Hab.: Bellenden-Ker, at an altitude of about 4,000 feet (Palm Camp), *Bellenden-Ker Expedition*, 1889.

In many respects this plant resembles *Hydriastele Wendlandiana*. I have, however, thought it advisable to keep it under *Areca* for the present, hoping to receive better specimens, those I collected being much damaged by wet. The tree will be remembered as having been specially referred to in Mr. Meston's report of the expedition.

Order RESTIACEÆ.

LEPTOCARPUS, R. Br.

L. Schultzii, *Benth.*, Fl. Austr. vii. 237. Rhizome shortly creeping, densely woolly, emitting numerous stems, those bearing the inflorescence rather stout and densely woolly, about 2 ft. in height, and but slightly branched; the barren stems much less woolly, shorter, and densely branched, the branchlets filiform. Male spike-like panicle slender, narrow, only slightly branched. Glumes acuminate, with scarious margins. Perianth-segments 5 or 6, the outer ones narrow and acuminate, the inner broader, thinner, and almost obtuse. Stamens 3. Female flowers in globular clusters, styles free.—Flora Austr. l.c. in part.

Hab.: Musgrave E. T. Station, Cape York Peninsula, *Geo. Jacobson.*

These specimens evidently belong to the above Port Darwin plant, but I found no stamen and only immature fruit.

Order FILICES.

Tribe HYMENOPHYLLEÆ.

TRICHOMANES, Linn.

T. muscoides, *Sw.* Rhizome creeping, tomentose, and like most of these small forms densely matted. Fronds from ¼ to ¾ in. long, much undulate, irregularly and some fronds deeply lobed, others nearly entire, stipes very short or wanting, the lamina tapering to the base. Costa prominent, the lateral veins simple or forked, joining at the margin into a vein and marginal band of reticulations. Indusium on the ends of the upper lobes of the frond, the mouth alone free, which latter is rather large and undulate. Receptacle of medium length.

Hab.: Barron River, on wood, *C. J. Wild.*

This Australian plant only differs from the species described from other parts in its smaller size.

T. Kurzii, *Bedd.*, Ferns of Brit. Ind. Pl. 286. Rhizome filiform, more or less tomentose. Fronds with stipes scarcely exceeding ½-in. long, simply pinnately lobed; base of stipes scaly-hairy at the base; lobes of frond narrow-linear, obtuse or almost acute, with costules but no lateral veins. Indusium sunk in the end of the lobe, mouth slightly lipped. Receptacle short.

Hab.: Daintree River, *C. J. Wild.*

The Australian plant only differs from the above in the greater regularity of the lobing of the fronds, which resemble a minute pinnate leaf.

T. Wildii (n. sp.) Rhizome slender, tomentose, forming dense masses on bark. Fronds including stipes about 1 in. high, pinnate, with

pinnatifid pinnæ, stipes flattened as in *T. Barnardiana*, with a few dark hairs at the very base. Pinnæ few, distant, with 3 or 4 linear lobes, veinless except the central costa. Indusium almost free on the upper side of the pinnæ some distance from the axil, mouth spreading but scarcely lipped.

Hab.: Near Cairns, *C. J. Wild.*

It is with some diffidence that I give to the above species specific rank; but it will not well agree with any Australian or other *Trichomanes* of which I have specimens or descriptions.

T. rigidum, var. laxum (n. var.) Rhizome short, thick and erect. Fronds 2 or 3 in. long, on slender stipes of 1 to 1½ in., almost linear-lanceolate in outline. Pinnæ distant. Indusia small, receptacle long-exserted as in the normal form.

Hab.: Near Herberton, and other localities.

This small form is often met with in Queensland, growing with the common form, but always seems quite distinct enough to be given as a named form.

Tribe POLYPODIEÆ.

ASPLENIUM, Linn.

A. Wildii (n. sp.) (After C. J. Wild, Entomological Collector, Queensland Museum.) Rhizome long, creeping, slender. Fronds distant or somewhat cæspitose, very weak, often flexuose, under 8 inches long including the filiform stipes which occupies half its length. Stipes mahogany-brown, glossy and slightly scaly at the base. Pinnæ quite membranous, from very few to 12, the lower ones free, the upper ones forming a pinnatifid apex which is sometimes slightly elongated, horizontally approximate, 3 to 9 lines long, 3 to 4 lines broad near the base, where the upper half is truncate and parallel with the rhachis, while the lower half is obliquely cut away nearly to the midrib; the apex obtuse or on the upper segments or pinnæ nearly acute, margins crenate. Costa very slender, veins distant, simple or forked, very oblique. Sori rather long, distant from the costa but approaching the margin.

Hab.: On rocks, Daintree River, *C. J. Wild.*

The nearest ally of this species seems to be *A. multijugum*, Wall., from which it differs in the form of rhizome, longer and fewer sori and less elongated, never, so far as at present known, proliferous apex.

A. affine, *Sw.*, Hook. Sp. Filic. iii. 169. Rhizome stout, subrepent, clothed above with copious, almost black, subulate scales; stipes aggregated, dark-brown, 4 to 10 in. high, partially and deciduously setoso-paleaceous, subcoriaceous, dark-brown (when dry), opaque, bipinnate, pinnate only at the apex; pinnæ petiolate, rather distant, 3 to 6 in. long; pinnules ½ to 1 in. long, petiolulate, obliquely rhombeo-ovate, obtuse or subacuminate, sublobate, unequally serrated in their superior half, terminal ones small and confluent into a pinnatifid apex, inferior pinnules with a large cuneate auricle at the superior base sometimes free, and sometimes though rarely the pinnules are again pinnated. Veins erect, parallel, subflabellate (giving a striated appearance), no distinct costa. Sori copious, linear but varying in length. Indusium firm, membranaceous.—*Hook. l.c.*

Hab.: Cooparoo Creek, Russell River, *C. J. Wild.*

The specimens collected by Mr. Wild differ so slightly from Sir W. J. Hooker's description that I have given it word for word. It is now known from many distant habitats, but not previously from Australia.

POLYPODIUM, Linn.

P. superficiale, var. australiense (n. var.) Rhizome said to be creeping over or along the branches of growing trees, but not collected and sent with the fronds; from the short curved base of the stipes it is probable that the fronds are attached to the lower or underside of the rhizome. Fronds linear-lanceolate, 12 or 13 in long, about 1 in. broad in the centre, decurrent upon the stipes almost to the base, the apex more or less acuminated, texture firm, costa prominent, no distinct costules, areolæ fine, irregular, with free veinlets; sori copious, scattered irregularly, only on the upper half of the frond.

Hab.: Atherton, near Herberton, *C. J. Wild.*

This plant would seem to differ from the normal form in the lamina of frond being decurrent to the base or to a stipes of only a few lines, and the sori being confined to the upper half of the frond.

Order MUSCI.

TREMATODON, Rich.

T. brachyphyllus, *C.M.* (n. sp.)

Hab.: Mount Perry, *J. Keys.*

WEISIA, Hedw.

W. graciliseta, *Broth.* (n. sp.)

Hab.: Mount Perry, *Jas. Keys.*

W. perlinearis, *C.M.* (n. sp.)

Hab.: Mount Perry, *Jas. Keys.*

BRYUM, Linn.

B. immarginatum, *Broth.* (n. sp.)

Hab.: Mount Perry, *Jas. Keys.*

B. subatropurpureum, var. minor, *Broth.*

Hab.: Mount Perry, *Jas. Keys.*

LESKEA, Hedw.

L. calochlora, *C.M.*

Hab.: Gladfield, *C. J. Gwyther.*

POROTRICHUM, Bridel.

P. (Thamniella) molle, *Broth.* (n. sp.)

Hab.: Mount Perry, *Jas. Keys.*

FABRONIA, Raddi.

F. brachyphylla, *C.M.*

Hab.: Brisbane River.

RHYNCHOSTEGIUM, Schimper.

R. strictiusculum, *Broth.* (n. sp.)

Hab.: Indooroopilly.

FISSIDENS, Bridel.

F. densifolius, *Broth.* (n. sp.)

Hab.: Mount Perry, *Jas. Keys.*

F. (Conomitrium) splachnoides, *Broth.* (n. sp.)

Hab.: Indooroopilly.

Order HEPATICÆ.

EU-LEJEUNEA, Stephn.

E. Armitii, *Steph.* Diœcious, medium, pale straw-coloured, creeping over other Liverworts. Stems pinnately many-branched, pinnules almost straight, unequal; leaves imbricate, patent, broadly ovate, concave, with recurved truncate-rotundate apex; cells of the leaves pellucid, at the margin ·012, centre ·035, base ·025-·05 mm., angular, and the middle part of the walls distinctly incrassate; lobules small; stems equal, ovate-triangular, inflated, abruptly truncate, angles dentiform, often obsolete, near the lamina somewhat thinner. Amphigastria distant, three times broader than the stem, transversely inserted, rotund, incised for two-thirds its depth, sinuses semi-rectangularly obtuse; laciniæ ovate, obtuse, rarely acute. Female flowers in short terminal pinnules, equal in length to the leaves of the cauline involucre but twice as narrow, lanceolate, acute. Amphigastria large, leaves of the involucre long, obovate, two-thirds incised, with lanceolate-obtuse laciniæ. Perianth ovate-obconical, apex rotundate, moderately rostrate, above quinqueplicate, folds ventral and divergent, deep, acute, finally confluent.

Hab.: Scrubs of Brisbane River. First found by E. W. Armit, at the south-east coast of New Guinea.

E. cuspidistipula, *Stephn.* (n. sp.)

Hab.: Scrubs of Brisbane River.

METZGERIA, Raddi.

M. australis, *Stephn.*, Hedwigia, 1889. Diœcious, glauco-virescent, densely cæspitose, furcate, or the ventral branches beneath the apex innovate; other ventral ramules numerous, all arising from the side of the costa. Front convex, margins strongly recurved, anterior surface glabrous, posterior in the costa sparingly, in the margin geminately setose; not at all rarely the seta are single or wanting, the cellules, however, from which they arise are always geminate. Alæ glabrous. Costa clothed with 2 cellular layers; central fasciculum in section 13-cellular, cells of the paginæ, of which there are 12-15, reach ·045 mm., and are trigonal. Female branchlets minute, arising from the side of the costa, base very narrow, from the disk to the centre subtriangularly dilatate, sparingly ciliate, towards the base radicant, in longitudinal section 6 cellules high. In this disk the involucre truly rises, enclosing the pistilla, towards the base of the ramules 3-4 cells high, towards the apex and in the sides much more evolute, convex-plane, cordiform, margin very ciliate, ramules disciform, upon which inserted. Pistilla 6-7, biseriately aggregated on the back of the disk. Antheridia in the costa of the lateral ramules and the apices of the lateral ramules, strongly incurved, biseriate; calyptra cylindrical, about the apex densely setose, at the base for one-fourth of its length solid, above with a thick wall 6 cells in section.

Hab.: Scrubs, Brisbane River.

Order LICHENES.

The following new and additional Lichens have been determined by the celebrated lichenologist Dr. Jean Müller, of Geneva :—

PHYSMA, Mass.

P. byrsinum, var. amphiurum, *J.M.* Spores usually, but not always, at one or both ends subulate-acuminate. (Syn.: *Collema amphiurum*, Nyl.)

Hab: Granite Creek, Bellenden-Ker.

LEPTOGIUM, Ach.

L. bullatulum, *J.M.* Thallus small and membranaceous, as in the similar *L. diaphanum*, Nyl., appressed, laciniæ crenate, margins ascending and crisped, but not finely dissected, entire or here and there crowdedly ciliate, other parts of the surface smooth or smoothish, subpellucid; apothecia 1·5 to 2 mm. wide, incrassate-marginate, the junior forms closely simulating those of *L. bullatum*, Nyl.; margin obsoletely gibberose, often concentrically plicate-unequal, always prominent; disk reddish; spores ·032 x ·016 mm., rhomboid-ellipsoid, rather copiously parenchymatous.

Hab.: Bellenden-Ker, on bark.

CALICIUM, Ach.

C. pachypus, *J.M.* Thallus argillaceo-flavid, very thin, maculiform; apothecia wholly black; stipes short and the base broadly conical, robust; capitulum turbinate oblong, truncate, easily seceding; spores ·009 x ·0045 mm., brown, when mature 2-locular.

Hab.: Cabbage-tree Creek, on dead wood, *J. F. Shirley*.

CLADONIA, Hffm.

C. rangiformis, var. sorediophora, *Wainio.* A sorediate state of *C. rangiformis*, Hoffm., of which the type greatly resembles *C. furcata*, Hffm.; but differs from *C. furcata* in its chemical reactions, and in its podetia, which are smaller, more slender, very attenuate and divergent at the apices, rather rigid, dichotomously branched, often dealbate, and growing in dense congested tufts.

Hab.: Brisbane Valley.

C. ochrochlora, var. ceratodes, *Flk.* A variety of *C. ochrochlora* with podetia resembling horns. The type is similar to *C. cornuta*, Fr., with glabrous podetia, the upper parts of which are dimidiate, and whitish or ochroleucous and pulverulent; the apices obtuse or bearing slender cups with dentate-radiate margins, and brownish fruits.

Hab.: Brisbane.

STICTINA, Nyl.

S. suborbicularis, *J.M.* Thallus substipitate, monophyllous, 3-3·5 cm. wide, orbicular, entire or crenate, or here and there shortly or obsoletely lobate, firmly membranaceous, plane or smooth, glabrous, rufescent-fuscescent; beneath more obscure, being in all parts, even to the margins, clothed in minute, flagelliform, obscure rhizinæ, with plumose apices; cyphellæ urceolate, acutely margined, at length ample.

Hab.: Brisbane Valley, on earth, rocks, &c.

S. argyracea, *Nyl.*, **f. isidiosa,** *J.M.* An isidiose form of the type, which latter is described by Nylander, as follows:—Thallus pallid or pallid lurid-rufescent or pallid lurid-fuscescent, mediocre (3-10 in.), somewhat rigescent, shining or subopaque, smooth, laciniate divided; laciniæ linear, subpinnatifid; divisions linear with apices truncate or retuse, above with small white soredia or isidiose points scattered over; beneath pallid ochraceous, subnude or fusco-tomentose or pallid albido-tomentose; apothecia fusco-rufous marginal or submarginal, 1·5-2 mm., girdled with a thin entire thalline margin; spores fuscescent, shortly fusiform, 1-3 septate, ·023-·033 x ·008-·012 mm. (Syn.: *S. argyracea*, var. *sorediifera*, Del.)

Hab.: Bellenden-Ker.

S. impressula, var. sublævis, *J.M.* Thallus above sparingly impresso-punctate, here and there wholly smooth, and at the margins of the laciniæ in places copiously dissecto-lacinuligerous.

Hab.: Bellenden-Ker.

S. punctillaris, *J.M.* Holding a middle place between *S. cinnamomea and S. fragillima*, more rigid than the former, and the laciniæ narrower and convex; and shorter and more crowdedly branched than the latter, beneath not costate, and, indeed from both in this receding, that its thallus is thicker, and above here and there scattered over with small points and rough punctures. These punctures produce some resemblance to *S. argyracea*, but are more numerous and smaller, and the general habit approaches *S. fragillima*.

Hab.: Whelanian Pools, Bellenden-Ker.

PARMELIA, Ach.

P. tiliacea, var. rugulata, *J.M.* Thallus as in the normal plant, but less albido-glaucous (as in var. *leucina*, J.M.), in the centre broadly, irregularly, and strongly rugiferous; apothecia with margins entire or at length plicate-rugose and subsorediose.

Hab.: Brisbane and Toowoomba.

COCCOCARPIA, Pers.

C. pellita, var. isidiophylla, *J.M.* Thallus as in the genuine form, but usually smaller, isidiose-furfuraceous as in var. *cronia*; apothecia as in var. *smaragdina*, fuscous or fulvo-fuscous.

Hab.: Bellenden-Ker.

PHYSCIA, Nyl.

P. picta, f. sorediata, *J.M.* Thalline surface above in places sorediate but not isidiophorous.

Hab.: Brisbane Valley, on trees.

PLACODIUM, DC.

P. glauco-lividum, *J.M.* Thallus glaucous or somewhat flavescenti-glaucous, minutely squamulose; squamules when evolute much smaller than the apothecia, rosular or sub-cuneiform, digitate-lobate or crenate, the small ones entire; apothecia loosely sessile, 1·5-2 mm. and smaller, at first glauco-livid, encircled by an entire prominent thalline margin, at length livid-fuscescent or lurid, flat or sub-convex, and usually distinctly subconcolori-marginate; spores 8, ·01-·012 x ·005-·007 mm.

Hab.: Helidon, on ant-hills, *J. F. Shirley.*

CALLOPISMA, De Not.

C. rubens, *J.M.* Thallus white, thin, continuous and smooth, at length evanescent; apothecia copious, crowded, commonly angular by mutual pressure, golden or orange-red, ·3-·8 mm., when young with thin white subcrenulate margin, usually immarginate and subplane; epithecium flavicant, but the lamina elsewhere hyaline; paraphyses rather conglutinate; spores 8-10-16, ·01-·011 x ·004-·006 mm., oblong-ellipsoid orculiform.

Hab.: On palings, near Brisbane.

LECANORA, Nyl.

L. subfusca, var. subgranulata, *Nyl.* Thallus roughened over with subgranulose asperities. Apothecia crowded, numerous, nigro-fuscous, margins crenulate.

Hab.: Mount Baupel, on bark, *J. F. Shirley.*

L. rhypoderma, *J.M.* Thallus sordidly and obscurely cinereous, thickly leprose, unequal; apothecia ·3-·4 mm., sessile, within obscure, girdled by a thin, entire, sordid white, at first prominent but finally evanescent margin; disk fusco-nigricant, lamina elsewhere obscurely hyaline; spores not well developed, ·012 x ·005 mm. (Syn.: *Pyxine obscurior*, Stirton; *Lecidea rhypoderma*, C. K.)

Hab.: Brisbane Valley, on bark.

L. connivens, *J.M.* Thallus glauco-cinereous, thin, crowdedly papillose-rugulose; apothecia copious, very often 1 mm. wide, elate, girdled by a thick margin, with smooth back, and crenate-paucidentate and connivent apex, at length 2-3 times broader, irregular, deplanate, and with extenuate closely plicate margin; disk black and nude, when young depressed; lamina and hypothecium cerasine-obfuscate; spores 8, ·013-·015 x ·006-·008 mm., ellipsoid.

Hab.: Brisbane Botanic Gardens, *J. F. Shirley.*

L. interjecta, *J.M.* Thallus albido-flavicant, thin, firm, rimulose; apothecia finally ·5 mm., appressed sessile, when young almost gyalectoid, thalline margin persistent, thickish, entire or obsoletely crenulate; disk carneo-fulvous, at length fulvo-fuscescent, flat, nude; epithecium fulvescent or subhyaline, lamina elsewhere hyaline; spores 8, ovoid, ·012-·014 x ·008-·01 mm.

Hab.: Brisbane Valley, on bark.

RINODINA, J.M.

R. xanthomelana, *J.M.* Thallus virenti-flavid, thin, continuous and smooth, at length rimulose; apothecia black, or when moist obscurely brown, ·3-·4 mm., immersed; thalline margin somewhat obsoletely emergent, often indistinct and the disk spuriously margined by a circular fissure, when evolute the margin is entire and concolorous; disk almost attaining the surface of the thallus, planoconcave, nude; epithecium nigro-fuscous; hypothecium hyaline; spores 8, 2-locular, ·015-·02 x ·008-·095 mm.

Hab.: Helidon, on rocks, *J. F. Shirley.*

PERTUSARIA, DC.

P. persulphurata, *J.M.* Thallus intensely sulphureous, thin, disperso-subglebulose or here and there strongly continuous, and diffracto-rugulose, superficies smooth or at length pulverulent; verrucæ

concolorous, ·7-1 mm., closely sessile, truncate-subhemispherical, at length granulose-pulveraceous; lamina scarcely visible. Allied to *P. lactea*, but the whole plant is intensely sulphureous.

Hab.: Brisbane, on rocks.

LECIDEA, Ach.

L. impressa, var. angulosa, *J.M.* Differs from the type in the crowded apothecia rendered angular by mutual pressure.

Hab.: Helidon, on rocks, *J. F. Shirley.*

L. cæruleo-nigricans, *Lght.* Thallus glaucous or cæruleo-nigricant or pallid olivaceo-fuscescent, squamulose; squamæ bullate or bullate-plicate at the centre, rotundato-lobate at the circumference, smooth, cæsio-pruinose; apothecia elevated, sessile, bluish-black, naked or cinereo-pruinose, plane, margin thick, obtuse, entire or flexuose; hypothecium nigro-fuscous; spores 8, colourless, fusiform, acute, 1-septate.

Hab.: Mount Perry, on rocks, *J. Keys.*

L. (Biatorella) hæmatina, *J.M.* Thallus flavescent-albid, very thin, granulose-pulveraceous, at length evanescent; apothecia ·5 mm. and less, flat, thinly and obtusely margined; margin entire, disk flat, nude, sanguineo-fuscous to subpallid, and slightly prominent; epithecium and hypothecium beautifully vinose-sanguineous; paraphyses finely capillary, readily separating; asci clavate, many-spored; spores ·0015 mm., globose.

Hab.: Bellenden Ker, near the foot.

PATELLARIA, J.M.

P. (Psorothecium) flavicans, *J.M.* Thallus flavicant, very thin, closely rimulose, at length granulose-pulverulent; apothecia when evolute 1 mm., always black, unicolorous, when young thick and obtuse and prominently crasso-marginate, when evolute subimmarginate, moderately convex and nude; epithecium and hypothecium thick, rufo-fuscous or obscurely vino-fuscous; lamina vinose-fusciculous; spores 8, broadly fusiform, 2-locular, ·02-·03 x 007-·008 mm.

Hab.: Goodna, on bark, *J. F. Shirley.*

P. (Psorothecium) melanodermia, *J.M.* Thallus white, very thin, smoothish, bordered by a broad brown line; apothecia 1-1·3 mm., obscurely sanguineo-atrous, very thick, with tumid, obtuse, prominent, entire and shining margin; disk flat, nude; perithecium thick, outer layer black, elsewhere subalbido-hyaline or beneath slightly obscurate, not at all nigro-fuscous; epithecium nigro-fuscous; lamina fuscescent-hyaline; spores 8, ·035-·04 x ·017-·02 mm., 2-locular, more or less incurved.

Hab.: Goodna, on bark, *J. F. Shirley.*

P. (Bacidia) rhodocardia, *J.M.* Thallus forming vinose-fuscescent spots; apothecia ·5-·8 mm., sessile, from plane at length convex; margin at first thick and prominent, livid-fuscous, finally extenuate and blackish; disk when young roseo-carneous, usually changing to brown or nigro-fuscous, always nude; lamina above deeply and beautifully carmine-roseate or at length pallid-roseate; hypothecium brown; spores 8, ·042-·05 x ·0015-·002 mm., thinly acicular, subincurved.

Hab.: Brookfield, on bark, *Field Naturalists.*

HETEROTHECIUM, J.M.

H. vulpinum, f. corallinum, *J.M.* Closely resembles *Patellaria leprolytra.* Thallus usually everywhere coralline-granulose. Spores as in the normal form.

Hab.: Helidon, on bark, *C. J. Wild.*

H. pulchrum, *J.M.* Thallus white, tartareous, from smoothish to crowdedly globulose-rugose; apothecia 1 mm. or larger, sessile, when young concave, thinly elevate marginate, when evolute flatter, always with sanguineo-croceus margin or finally obscure and undulate; disk subplane, albido-carneous, pruinose stratum gilvous or chryseo-ferrugineous; epithecium rufo-fulvous; hypothecium electrine fuscescent; lamina hyaline; paraphyses capillary, not at all connected; spores solitary, hyaline but finally fulvescent-obscurate, 1 x ·03 mm., crowdedly parenchymatous, locelli in series of about 25 to a transverse row.

Hab.: Goodna, on bark, *J. F. Shirley.*

CŒNOGONIUM, Ehrenb.

C. implexum, *Nyl.* Thallus green and fur-like, of filaments consisting of tubules ·012-·015 mm. broad. Apothecia flesh-coloured, resembling those of *Gyalecta* in colour and form, from urceolate when young to convex when mature; disk pale or in old state lost, leaving the pale cup of the hypothecium; hymenium colourless or very pale blue under iodine; paraphyses discrete, with slightly thickened apices, which are of a pale yellowish brown tint; spores 8, in ribbon-shaped asci, ellipsoid, colourless, 1-septate, ·0075 x ·005 mm.; hypothecium pale brownish yellow.

Hab.: Brisbane Valley, on bark.

BIATORINOPSIS, J.M.

B. zonata, *J.M.* Thallus flavicant or flavido-virescent variegate, at length argillaceo-expallent, suborbicular, broadly spread, bordered by an argenteo-exalbescent shining zone, 1-3 mm. wide, very thin and smooth; gonidia abbreviate-chroolepoid; apothecia ·4-·7 mm., loosely sessile, flat, girdled by a pale, very thin, entire margin, at length convex, pallid carneous; lamina wholly hyaline; paraphyses free, apices clavate; spores subuniseriate, 8, ·004-·006 x ·002-·0025 mm., 2-locular.

Hab.: Bellenden-Ker, on leaves.

LEPTOTREMA, J.M.

L. diffractum, *J.M.* Thallus glauco-albid, very thick, at first continuous and smooth, then diffract and very irregular, areolæ unequal and irregular, truncate-plane and smooth, minutely many-fruited; apothecia innate, subglobose, ·2 mm. wide, ostiolum depressed-concave, cinereo-nigricant, ·1 mm., not girdled by a prominent or discoloured ring; perithecium thin, with the epithecium obfuscate; spores (brown), ·016-·018 x ·006-·007 mm., ellipsoid-fusiform, 6-locular, occasionally the intermediate loculi longitudinally divided.

Hab.: Bellenden-Ker, on branches.

THELOTREMA, J.M.

T. argenteum, *J.M.* Thallus glauco-argenteous, thin, effuse, very smooth, continuous, at length rimulose-fissured, the fissures white; apothecia immersed in thalline prominences, truncate, smooth or ulcerate-pulveraceous, whiter than the thallus and slightly concave, the centre furnished with nigro-punctiform ostiolum, within ·3 mm. wide; perithecium except near the ostiolum hyaline; spores (hyaline) ·016-·018 x ·011-·014 mm., broadly ellipsoid, at both ends rotundate-obtuse, from 4-locular to parenchymatous, locelli arranged in 4 irregular series, in each row 2-3 cellules.

Hab.: Summit of Bellenden-Ker, on decorticated wood.

T. megalosporum, *J.M.* Thallus subflavescent-albid, thin, closely rugose, and also thickly and minutely rugulose, shining; apothecia in concolorous and rugulosely hemispherical thalline prominences, 1·5-1·8 mm.; ostiola punctiform, depresso-umbilicate, entire; perithecium complete, nigro-fuscous, the centre of the base stoutly columelligerous; spores solitary, very large, ·26-·4 x ·045-·055 mm., fusiform, at the extremities cuspidate-acuminate, very finely parenchymatous.

Hab.: Brookfield, on bark, *Field Naturalists.*

T. bicuspidatum, *J.M.* Thallus ochraceo-albid, thin, rugulose, very finely impresso-punctulate, subfarinulent; apothecia in small, subfarinose, hemispherical, thalline prominences, ·5 mm. wide; ostiola ·12 mm., obtuse and entire; perithecium nigro-fuscous, complete, in the centre of the base deeply columelliferous; spores solitary, hyaline, ·18-·25 x ·024-·038 mm., about 50-locular, crowdedly parenchymatous; at both ends cuspidate-acuminate, last 5-6 loculi at both cusps simple.

Hab.: Sankey's Scrub, on bark, *J. F. Shirley.*

T. endoxanthum, *J.M.* Thallus glauco-cinereous, thickish, rugose, surface smooth; fertile verrucæ depresso-hemispherical, irregular, obtusely angulose, within pale yellow; ostiola cinereo-nigrous, punctiform, slightly prominent; perithecium, except the black apex, pallid; hypothecium flavid; asci 1-spored; spores hyaline, ·3 x ·05 mm., fusiform, at both ends not at all cuspidate-acuminate, crowdedly parenchymatous.

Hab.: Mount Baupel, on bark, *J. F. Shirley.*

T. rimulosum, *J.M.* Thallus argillaceo-pallid, very thinly tartareous, obsoletely rugulose, at length crowdedly and deeply reticulate-rimulose; apothecia semi-emergent, small, hemispherical, ·4 mm., regular, opening by a small white pore; perithecium hyaline, above fulvescent, the interior, except the apex, black; asci 1-spored; spores hyaline, ·21 x ·05-·06 mm., fusiform, at both ends obtuse, copiously parenchymatous, locelli in numerous transverse series.

Hab.: Brisbane Valley, on bark.

OCELLULARIA, J.M.

O. zeorina, *J.M.* Thallus whitish, very thin, continuous and smooth; apothecia when young enclosed in conical thalline protuberances, ostiola in junior forms ·1-·2 mm., finely nigro-annulate, within whitish, at the centre pertuse, then gradually strongly aperient, when evolute 1-1·3 mm. wide, zeorine-lecanorine, appressed sessile, and resembling *Lecanora albella*, Pers., in being strongly margined by the thalline protuberances, margin within adorned by a subnigrous circular line, entire.

prominent ; disk gaping, depressed, flat, very cinereo-pruinose ; perithecium near the apex fulvo-fuscous or nigricant, in all other parts hyaline ; spores 4, hyaline, ·08-·11 x ·008-·01 mm., 16-22 locular, loculi always simple.

Hab. : Brookfield, on bark, *Field Naturalists.*

O. pulchra, *J.M.* Thallus cæsio-albid, thin, continuous, at length rimose ; young apothecia gyalectoid, emergent, radiately aperient, when evolute 1·5-2 mm., widely gaping. The margin in 5-8 subtriangular recurvo-radiant lobes, within subfarinose ; disk plane, almost attaining the surface of the thallus, black, cæsio-pruinose, entire ; perithecium olivaceo-fuscous ; hypothecium subhyaline or slightly olivaceous ; lamina in part hyaline ; asci biseriately 6-8-spored ; spores hyaline, ·033-·045 x ·005 mm., narrowly fusiform, at both ends obtuse, about 14-18-locular.

Hab.: Goodna, on bark, *J. F. Shirley.*

O. diffractella, *J.M.* Thallus glaucescent-albid, moderate, from originally continuous and smooth to irregular and very depresso-glebose ; glebulæ subgibbose and rather concave, surface levigate, at length thinly rimulose, base coherent with the thallus ; apothecia wholly immersed or showing as nano-hemispherical prominences, within ·8 mm. wide ; ostiola ·12-·2 mm., black ; spores 8, hyaline, ·015-·02 x ·006-·008 mm., fusiform, 6-locular.

Hab.: Bellenden-Ker, on bark.

O. Baileyi, *J.M.* Thallus glauco-albid, thin, continuous, smooth and shining or at length slightly unequal ; apothecia innate and barely prominent, at length nano-conical ; ostiola from punctiform at length ·3-·5 mm. wide, subentire, within white, at the base white, perithecium within everywhere nigro-fuscous, the base, however, clothed with a thick white stratum when evolute, beneath ·3 mm. thick ; spores 8, hyaline, ·035-·04 x ·008-·01 mm., ovoid-fusiform, 8-10-locular.

Hab.: Bellenden-Ker, on bark.

O. goniostoma, *J.M.* Thallus glauco-olivaceous, very thin, at length thinly depresso-glebose, glebulæ at the base thalline joined ; apothecia at length hemispherical-emergent, 1 mm. wide, the back gibbose-unequal, the vertex not at all depressed ; ostiola ·2-·7 mm. wide, commonly acutely 3-4-angled or furnished with acute transverse rimulæ, in the base always black ; thalamium 1 mm. thick ; perithecium in the upper part (within) at length nigro-fuscous, wanting beneath the hymenium ; central column intensely nigro-fuscous, small, thick ; spores 8, biseriate, hyaline, ·028-·033 x ·007-·008 mm., at both ends rotundate-obtuse, 6-8-locular.

Hab. : Bellenden-Ker, on bark.

O. xantholeuca, *J.M.* Thallus flavescent-albid or from flavescent to glauco-albid, thin, somewhat irregularly glebose-unequal ; apothecia semi-emergent, ·5-·7 mm. wide ; thalline protuberances small, thick, rigid, the vertex terminating with an ostiolum from rotundate-punctiform to slightly stellate-dehiscent or at length urceolari-angular and obsoletely fissured ; the neck of the ostiolum black ; perithecium within and above nigro-fuscous, base beneath the annular lamina wanting, in the centre evolute in a black column ; spores 8, hyaline, ·032-·038 x ·008-·009 mm., fusiform, 8-9-12-locular.

Hab. : Bellenden-Ker, on bark.

MELASPILEA, J.M.

M. (Eumelaspilea) congregans, *J.M.* Lirellæ inhabiting the thallus of other (pyrenocarpous) lichens, sessile, ·3-·5 mm. long, simple, oblong-ellipsoid, when evolute widely opened and furnished with a thin margin, opaque blackish, more or less gregately crowded, and here and there conglomerately crowded; hypothecium hyaline; asci biseriately 8-spored; spores ·015-·018 x ·007-·01 mm., obovoid, 1-septate, not at all constricted, the superior articulus often slightly broader. Allied to *M. intrusa*.

Hab.: Brookfield, on bark, *Field Naturalists*.

OPEGRAPHA, Ach.

O. interveniens, *J.M.* Thallus beneath the bark, forming with the cortical epidermis fuscescent-pallid spots, girdled by a black zone; apothecia black, appressed to the surface, small, base not constricted, everywhere nude, ·2 mm. broad, the length about six times the breadth, straight, simple, or rarely bifurcate; lips closely connivent-closed or the apex slightly concave forming a narrow groove; perithecium with base complete, black; asci oblongate, 8-spored; spores ·023-·025 x ·004-·006 mm., digitiform-fusiform, (6-) 8-locular, loculi of equal length.

Hab.: Bellenden-Ker, on bark.

PHÆOGRAPHIS, J.M.

P. (Phæodiscus) leiogrammodes, *J.M.* Thallus hypophlœodal, evanescent, pallid flavescent, about the lirellæ forming yellow spots, thickening into tumid yellow lips; lirella simple or once and shortly furcate, straight or wavy or curved, to 3 mm. long; disk black, at first rimiform, finally canaliculate to broad and plane; proper margin black; thalline lips pale bright-yellow, longitudinally 1-sulcate; perithecium fusco-nigrous, lateral, wanting beneath the disk; spores 4-locular.

Hab.: Sankey's Scrub, *J. F. Shirley*.

GRAPHIS, J.M.

G. (Aulacogramma) rimulosa, var. pulverulenta, *Nyl.*

Hab.: Bellenden-Ker.

G. (Fissurina) albo-nitens, *J.M.* Thallus white, nigro-limitate, very thin, levigate and shining; lirellæ erumpent, very small, obsoletely emergent, linear, laterally thalline clothed, subsimple, the base in section ·4 mm. wide; disk brownish, faintly visible; perithecium brown, thin, base everywhere deficient; lamina in section truncate-conical; asci 8-spored; spores imbricately uniserial, hyaline. ·01-·011 x ·005-·006 mm., 4-locular. Near *G. pertenella*, Stirton.

Hab.: Bellenden-Ker, on bark.

G. (Fissurina) lævigata, *J.M.* Thallus argillaceo-albid, thin, levigate, here and there slightly rugulose, obsoletely nitidous, girdled by a broad white zone; lirellæ from orbicular to elongate-linear, variously arcuate-curvate or sigmoid-curvate, intricate, commonly simple, ·3-·35 mm. broad, emergent, thickly thalline clothed; lips white or subpulverulent from the thalline stratum at their apices, turgid, obtuse; proper interior margin seen from above is nude and

black; perithecium at the base wanting; lips in section above nigro-fuscous, towards the base pallid and thinner; thalamium with rotundate base; spores 8, hyaline, 4-locular, ·013 x ·005 mm. Near *G. albo-nitens*, J.M.

Hab.: Sankey's Scrub, on bark, *J. F. Shirley*.

Section Phanerographis, *J.M.*

Perithecium black, base complete, disk at length opening widely, plane.

G. (Phanerographis) semiaperta, *J.M.* Thallus argillaceo-albid, very thin, smooth or obsoletely rugulose; lirellæ ·25 mm. wide, linear, simple and furcate, numerous, intricate, semi-emersed, opaque, black, nude; lips black, outwardly thalline clothed, very slender, not at all sulcate, when dry slightly connivent, when moist widely separating; disk when moist flat, dull black; perithecium fusco-nigrous, base thick, complete; asci 8-spored; spores hyaline, ·022-·028 x ·007-·008 mm., obtusely fusiform, 6-8-locular.

Hab.: Bowen Park, on bark.

Section Diplographis, *J.M.*

Lirellæ with lips closely connivent, longitudinally sulcate, not at all black, and spores (2-) 4-locular.

G. (Diplographis) robustior, *J.M.* Thallus olivaceo-virescent, cartilagineous, very thin, levigate, here and there rugulose, shining; lirellæ thick and strong, 5-10 x ·8-1 mm., very convex, variously curved, often simple, thalline clothed; lips closely connivent, thick, strongly longitudinally pauci-sulcate, costulæ longitudinally obtuse; perithecium fulvescent; spores in narrow asci, 8, 1-seriate, hyaline, 4-locular, ·013-·016 x ·0055-·0065 mm.

Hab.: Three-mile Scrub, on bark, *J. F. Shirley*.

G. (Eugraphis) scripta, var. recta, *Nyl.* Thallus pale yellow or straw colour, in horizontally elongated patches, nigro-limitate; lirellæ very numerous, elongated, narrow, simple, horizontal and parallel, acuminate and sharply pointed at the extremities; epithecium canaliculate, naked and subpruinose; proper margin thick, elevated; spores as in type.

Hab.: Brookfield, on bark, *Field Naturalists*.

GRAPHINA, J.M.

G. (Medusulina) egenella, *J.M.* Thallus pallid argillaceous, very thin, hypophlœodal, evanescent, about the lirellæ tumid and albescent and confluent in thickish maculæ; lirellæ very small, slender, linear, almost simple, erumpent, laterally thalline clothed, everywhere immersed; disk ·05-·1 mm. wide, faintly carneous or nude; perithecium above fulvescent pallid, elsewhere indistinct; spores 8, biseriate, hyaline, ·012-·014 x ·0065-·008 mm., ellipsoid, at both ends obtuse, 4-locular, loculi always 2-locellate.

Hab.: Bellenden-Ker.

PHÆOGRAPHINA, J.M.

P. (Chrooloma) chrysentera, *J.M.* Thallus thin, even, continuous, smooth, levigate, resembling old wax in colour and appearance; lirellæ numerous, thick, 12 mm. long by ·5-·8 mm. wide, pale

yellowish or pallid golden, thickly thalline clothed; disk pallid, rimiform; lips deeply and longitudinally sulcate, thick, connivent. Spores usually 1-4 in asci, brown, fusiform oblong, murally divided, ·06-·115 x ·02-·035 mm.

Hab.: Enoggera Scrub, *J. F. Shirley*.

P. (Chrooloma) contexta, *J.M.* Thallus thickish, continuous, pallid-flavescent or pallid-flavo-glaucescent, smooth or minutely rugulose or in parts undulate; lirellæ concolorous or the lips paler, stellately aggregated, the branches simple or furcate or with pinnate branchlets; disk at first rimiform with lips connivent, finally disclosed, plane, fulvescent; lips pallid-flavescent, longitudinally 1-sulcate.

Hab.: Bellenden-Ker.

ARTHONIA, Ach.

A. gregaria, var. purpurea, *Eschw.* Thallus and apothecia purple in colour, apothecia pruinose, and spores as in var. *adspersa.* (Syn.: *Conioloma coccineum*, var. *purpureum*, Eschw.)

Hab.: Bellenden-Ker, on bark.

A. leptospora, *J.M.* Thallus olivaceo-albid, very thin, smooth; gonidia concatenate with constricted articulations, articuli rhomboideo-elliptical; apothecia when dry or moist outwardly and inwardly black, about ·3 mm. wide, obsoletely and obtusely astroideo-lobate or orbicular or oblong, straight or curved, destitute of a margin; asci globose-pyriform, with pachydermatous apex; spores 8, hyaline, ·012-·014 x ·0025-·0035 mm., digitiform, subequally (3-) 4-5-locular.

Hab.: Mulgrave River, on bark.

MYCOPORELLUM, J.M.

Apothecia collected in small groups, the whole surrounded by a common perithecium, or each apothecium having its own covering; apices of apothecia free, forming small papillæ; spores hyaline, transversely divided.

M. perexiguum, *J.M.* Thallus forming cinereo-albid maculæ; apothecia ·1-·125 mm., numerous, deeply hemispherical or almost spherical, base truncate, black, opaque, when dry rugulose; peridium 1-fruited, base wanting, in other parts thick, nigro-fuscous; asci ovoid, above narrow and the periderm here thickened, 8-spored; spores hyaline, very digitiform, ·018-·024 x ·005-·0065 mm., equally 4-6-locular.

Hab.: Brookfield, on bark, *Field Naturalists.*

GLYPHIS, Ach.

G. favulosa, var. depauperata, J.M. Verrucæ small, ·3-1·3 mm., prominent, base constricted, whitish; apothecia 1-10, crowded, abbreviated; spores as in var. *intermedia.*

Hab.: Bellenden-Ker, on bark.

G. cribrosa, *Fée.* Thallus smooth, levigate, flavescent to fulvescent or fulvo-fuscescent, areolate, areolæ large, separated by deep fissures, the whole bordered by a fuscous zone; stromata raised above the thallus, at first thalline velate, but finally denudate and then nigro-fuscous; apothecia numerous, rounded or oblong, nigro-fuscous, giving the stromata a honeycombed appearance under the lens.

Hab.: Bellenden-Ker.

Tribe XYLOGRAPHIDEÆ.

DIPLOGRAMMA, J.M.

Thallus obsolete; gonidia mixed with the cellules of the substratum, globose, green; apothecia gymnocarpous, lirelliform, duplicate, as if formed from two completely longitudinally connate lirellæ of an *Opegrapha;* perithecium of 4 parallel lips, bearing 2 parallel hymenia, each hymenium furnished with 2 similar, connivent-incurved lips; paraphyses connected; spores hyaline, transversely divided.

D. australiensis, *J.M.* Thallus outwardly indistinct; gonidia ·008-·009 mm. wide; lirellæ 1-1·5 mm. long and ·3 mm. wide, black, somewhat shining above, sessile and thickish, usually simple, often sigmoid-curvate or straitish, snail-shaped, at both ends obtuse or obtusish, wholly longitudinally 4-labiate, and 3-sulcate; perithecium black; base thick, complete; disk rimiform, very narrow; lamina subhyaline; spores in obovoid-cylindrical asci, 8, ·015-·018 x ·004-·005 mm., dactyloid, at both ends obtuse, 4-locular.

Hab.: Brookfield, on bark, *Field Naturalists.*

CAMPYLOTHELIUM, J.M.

C. defossum, *J.M.* Thallus flavescent-albid, thin, rugulose, superficially and very minutely ulcerate-unequal; apothecia wholly defosso-occult, black, indicated in the apices of the papillæ by closed, ulcerate, whitish foveola, moderately thick, commonly arising obliquely from the base, above narrowing into a long, stout, subperpendicular neck; spores solitary, hyaline, ·15-·235 x ·04-·05 mm., crowdedly cubose-parenchymatose.

Hab.: Sankey's Scrub, on bark, *J. F. Shirley.*

C. nitidum, *J.M.* Thallus hypophlœodal, forming with the epidermis smooth, shining, whitish spots; apothecia black, from thalline clothed at length nude and shining, pyriform, horizontal, narrowing into a short horizontal neck, fertile part ·3 mm. wide; perithecium complete, attenuate below; paraphyses capillary; asci when young 8-spored, at length almost abortive; spores hyaline, ·04-·05 x ·014-·017 mm., oblong-ellipsoid, parenchymatous; locelli in 12-16 transverse series of 2-4 cellules each.

Hab.: Brookfield, on bark, *Field Naturalists.* (Not Bellenden-Ker, as reported in Bulletin No. 9, p. 30.)

PLEUROTHELIUM, J.M.

Fruit simple; perithecium with 1 decurvo-sublateral ostiolum; spores brown, parenchymatous.

P. australiense, *J.M.* Thallus olivaceo-pallid, levigate, very thin; apothecia solitary in small thalline prominences, innate, black, medium, almost horizontally flask-shaped; the ostiolum at first evident, but the thalline stratum then broken forming an ovoid cicatrix ·6 mm. wide, black; asci 1-2-spored; spores from hyaline to brown, ·175 x ·04 mm., finely parenchymatous, locelli subcubical in series of 5-8 each transverse row.

Hab.: North Pine, on bark, *J. F. Shirley.*

TRYPETHELIUM, J.M.

T. oligocarpum, *J.M.* Thallus cupreo-pallid, very thin, levigate; stroma 1-4-5-fruited, when single-fruited conico-hemispherical,

regular, above cupreo-fuscidulous and shining, terminating in a narrow umbilicate ostiolum, ·5 mm. wide; when 2-5-fruited larger and irregular, with apex 2-5-gibbose, within wholly obscure; perithecium black; spores 8, hyaline, 4-locular, ·018 x ·008 mm.

Hab.: North Pine, on bark, *J. F. Shirley*.

PARMENTARIA, J.M.

P. Baileyana, *J.M.* Thallus flavescent-albid, thin, smooth, cartilaginous; stromata rudimentary, small-fruited, 2 mm. wide; apothecia 1-4 in each stroma, often 2-3, almost horizontal, wholly longitudinally semi-emergent, pyriform, clothed with an impure black, thin, thalline stratum, separated from below the centre; common ostiolum minute, mamillary, subconcolorous; paraphyses capillary and free; asci 8-spored; spores brown, ·028-·034 x ·013-·016 mm., oblong-ellipsoid, 10-locular, each loculus 3-4-locellate.

Hab.: Bellenden-Ker, on bark.

BATHELIUM, J.M.

Fruit simple, perithecia with 1 common decurvate-sublateral ostiolum; spores hyaline, parenchymatous.

B. chrysocarpum, *J.M.* Thallus flavescent-pallid, very thin, cartilaginous, slightly rugulose; stromata 1·25 mm. wide, hemispherical, base not constricted, ochraceo-subaureous, obsoletely rugulose, apex furnished with a common, solitary, black, not at all emergent ostiolum, 1-fruited, rarely 2-fruited; perithecium black, thick; asci 8-spored; spores hyaline, ·12 x ·028 mm., fusiform, towards both extremities obtusely angustate, about 20-locular, the loculi many-locellate.

Hab.: Bellenden-Ker, on bark.

MELANOTHECA, J.M.

M. subsimplex, *J.M.* Thallus forming with the substratum flavescent-pallid spots, levigate; apothecia for the most part simple, here and there closely connate, ·8 mm. wide, nano-hemispherical, regular, levigate, at first thalline-velate, finally bare, black and shining; apex minutely umbilicate; stroma black without and within; spores 8, 1-seriate, brown, ·016-·018 x ·0075-·0085 mm., regularly 4-locular.

Hab.: Bellenden-Ker, on bark.

PORINA, J.M.

P. (Euporina) Araucariæ, *J.M.* Thallus cinereo-virescent, very thin, continuous, smooth, finally obsoletely rugulose and desquamescent, girdled by a cæruleo-nigricant zonula; apothecia ·5-·6 mm. wide, conical, concolorous with the thallus, apex obtuse, ostiolum not at all emergent, from obscurely fulvous to nigricant, outline smooth and regular, base sinking gradually into the thallus; perithecium pallid; spores 8, fusiform, ·065-·078 x ·013-·015 mm., 10-16-locular.

Hab.: Brookfield, on bark, *Field Naturalists*.

P. (Euporina) bellendenica, *J.M.* Thallus deeply olivaceo-virescent, thin, continuous, smooth; apothecia emergent from the thallus, thalline-clothed, obtusely nano-hemispherical, apex terminating in a pallid or usually nigricant or sub-nigrous ostiolum, clothed with

a thalline stratum for ·5 mm. from base ; perithecium about the apical part as if operculiform, everywhere fulvescent-pallid ; spores 8, ·045 x ·002-·0035 mm., 12-16-locular.

Hab.: Bellenden-Ker, on bark.

CLATHROPORINA, J.M.

C. desquamans, *J.M.* Thallus olivaceous, thin, smooth or smoothish, finally readily desquamescent ; apothecia large, emergent from thalline protuberances, but towards the base sloping into the thallus, apex entire ; ostiolum fulvous, at length fusco-nigrescent ; perithecium pallid ; spores 8, ·06-·075 x ·016-·022 mm., fusiform, parenchymatous.

Hab.: Sankey's Scrub, on bark, *J. F. Shirley.*

C. flavescens, *J.M.* Thallus albid-flavescent, thin, closely rugose and also rugulose, easily desquamescent ; apothecia in irregular, rugose or rugulose, unequal, thick, thalline prominences, little distinct from the thallus, and not constricted below ; perithecium pallid ; spores 8, ·07-·08 x ·013-·016 mm. parenchymatous.

Hab.: Brookfield, on bark, *Field Naturalists.*

PYRENULA, J.M.

P. nitidans, *J.M.* Thallus fuscescent-pallid or whitish, very thin, levigate ; apothecia at length semi-emergent, thalline-clothed, fusconigricant ; perithecium subglobose, base thin ; paraphyses capillary, easily separating ; asci (4-) 8-spored ; spores brown, ·028-·033 mm. long, oblong-ellipsoid, at both extremities obtusely and subapically acute, loculi 4, rhomboid, almost equal.

Hab.: Bellenden-Ker, on bark.

P. melaleuca, *J.M.* Thallus white, very thin, continuous, levigate ; apothecia ·3-·4 mm., semi-emergent, nude, three times broader than high, base moderately convex, at the sides in section somewhat obtusely angulose-product ; ostiolum minutely punctiform-umbilicate ; perithecium complete, base thin ; spores 8, brown, regularly 4-locular, ·015-·018 x ·008-·009 mm., at both ends broadly obtuse.

Hab.: Brookfield, on bark, *Field Naturalists.*

P. nigro-cincta, *J.M.* Thallus fusco-olivaceous, finally cupreo-fuscous, very thin, smooth and continuous to reticulate-rimose ; apothecia with apex somewhat emergent or for a third part from the summit denudate, black and opaque, in section about ·4 mm. broad, and about three times broader than high : perithecium with base complete, the centre of the base is commonly retuse, the sides are rotundate, not angulose-produced ; spores 8, 1-seriate, brown, regularly 4-locular, ·012-·015 x ·006-·007 mm.

Hab.: Brookfield, on bark, *Field Naturalists.*

ANTHRACOTHECIUM, J.M.

A. oculatum, *J.M.* Thallus flavescent-pallid, very thin, continuous, levigate ; apothecia semi-emergent from thalline prominences 1·25-1·5 mm. wide ; these papillæ are hemispherical, the base spreading into the thallus, levigate ; the apical part of the apothecia nude, blackish, convex, ·5 mm. wide, the centre umbilicate impressed, nigro-oculate, the apical depression and the part surrounding it also blackish ; perithecium globose, complete, black ; spores brown, 1-4 in ascus, ·08-·1 x ·022-·027 mm., 8-locular, laxly parenchymatous.

Hab.: Brookfield, on bark, *Field Naturalists.*

Order FUNGI.

AGARICUS, Linn.

A. (Clitocybe) pruinosus, *Lasch.* in Fries. Hym. Eur. 101; *Cke.*, Brit. Fungi. Pileus 1 to 3 in. across, between fleshy and membranaceous, umbilicate, then infundibuliform, rather even, hygrophanous, sprinkled with a greyish bloom, stem 1 to 3 in. high, stuffed, somewhat ascending, fibrillose, pallid, gills adnate, then decurrent, crowded, narrow, white, then dingy.—*Cke.*, Illus. t. 231.

Hab.: Near Brisbane, *J. H. Simmonds, R. J. Cribb, and others.* Usually found on pine-wood in Europe.

MARASMIUS, Fries.

M. equicrinis, *F. v. M.; Berk.*, Journ. Linn. Soc. xviii. 383; Grev. viii. 153; Sacc. Syll. v. 553. Horsehair Fungus. Small whity-tawny; pileus membranous, convex, obtuse, 1 to 2 mm. broad; stipe 1 cm. and more long, setaceous, rigid, shining, arising from a black mycelium resembling horsehair; gills few, distant, paler than the pileus.—Sacc. Syll. Fung. v. 553.

Hab.: Common on dead sticks and leaves on the ground, and frequent on live twigs in the dark damp scrubs of all parts of Queensland. After the description of this fungus in Grevillea is the following note:—"A very curious species. The rhizomorphoid mycelium resembles horsehair, and is profusely developed, whilst the pilei are very seldom produced. The stems rise at right angles from the decumbent mycelium. The only perfect specimens are in the Berkeley Herbarium, Royal Gardens, Kew." The absence of pilei from all the specimens which I have seen in Queensland scrubs, both north and south, quite confirms the opinion expressed above that they are of rare occurrence, and the absence of fruit-bearing organs has been the cause of the plant being described as a Lichen by Dr. C. Knight under the synonym *Alectoria australiensis*, and as a fungus by C. E. Broome as *Thamnomyces hippotrichoides.*

LENTINUS.

L. hyracinus, *Kalch.* in Grev. viii. 153. Pileus slightly fleshy, sessile, semi-orbicular, narrowed to a substipitiform base, 2 cm. broad and long, smooth, the back rugulose, subtomentose front glabrous, umber-coloured, gills adnate, crowded, narrrow or somewhat broad, dentate, colour pale.

Hab.: Eudlo Creek, *Field Naturalists;* Richmond River, N.S.W., *F. v. M.*

CLAVARIA, Linn.

C. fusiformis, *Sow.* (Spindle-shaped clubs.) Cæspitoso-connate, rather firm, yellow, smooth, about 3 in. high, soon hollow; clubs somewhat fusiform, simple, and toothed, even; base attenuated, of the same colour, erect and often brittle, with the apex often darker in colour.—*Cooke* in British Fungi.

Hab.: Eudlo Creek, *Field Naturalists.* Found also in Europe, America, and Ceylon.

EXIDIA, Fries.

Fungi cup-shaped, truncate or effused, often papillose; spores reniform, continuous for some time, when germinating 2 or more celled, producing curved sporidioles.—*Cooke*, Grev. xx. 17.

E. albida (*Huds.*) (*Tremella albida*, Fries.) Ascending, tough, expanded, undulate, subgyrose, pruinose, whitish, when dry brownish; spores oblong, obtuse, curved, biguttulate, subhyaline, 12-14 x 4-6 μ.

Hab.: On the bark of dead logs in Eudlo Scrub, *Field Naturalists.*

XYLARIA, Fries.

X. castorea, *Berk.*, N. Z. Fl. ii. 204, t. f. 10. Stem ¼-in. high, longitudinally wrinkled, downy, then glabrous. Receptacle ovate, compressed, obtuse, 1 in. long, 6 to 8 lines broad, dotted with the mouths of the perithecia. Asci slender, sporidia subelliptic.—*Berk. l.c.*

Hab.: Northern Island, New Zealand, on dead wood. Specimens of this fungus were also forwarded by Miss Bertram from Rockhampton to Mrs. Wm. Martin, of Melbourne, by whom they were sent to Dr. M. C. Cooke for determination.

USTILAGO, Lamk.

U. bursa, *Berk.* in Hook. Journ. Sacc. Syll. Fung. vii. 473. Sorus greenish, 5 mm. long; spores elliptic, somewhat dense, 10 to 11 μ long, sooty-black, verrucose-echinate.

Hab.: Infesting the grain in the inflorescence of *Anthistiria frondosa*, Walsh River, *T. Barclay-Millar.* This is the first time it has been met with in Australia. In India, however, we learn from Dr. Hooker in Sacc. Syll. Fung. l.c. that it is found infesting the grain of *Anthistiria arundinacea.*

HYPOCRELLA, Sacc.

(The diminutive of *Hypocrea.*)

Stroma somewhat fleshy, pulvinate or disciform or subeffuse, darkly coloured or brownish. Perithecia immersed or semi-immersed in the stroma. Asci cylindric, 8-spored. Sporidia filiform, nearly as long as the ascus, at length disarticulating.—Sacc. Syll. ii. 579.

H. axillaris, *Cooke*, Grev. xx. 4. Stroma obturbinate or obclavate, seated in the upper axils (5 mm. long, 2-3 broad), black, opaque, minutely granular with the ostiola; substance white. Perithecia very minute, immersed in the periphery. Asci cyclindrical, 120 μ long. Sporidia filiform, at length multiseptate (about 100 μ long), hyaline.—*Cooke, l.c.*

Hab.: On a grass (*Eragrostis stricta*), Walsh River, *T. Barclay-Millar.* Dr. Cooke notes that this new species somewhat resembles *H. bambusæ*, but larger and less globose. Size and form not unlike *H. strangulans*, Mont. Upon more mature consideration both these appear to have greater relationship with *Hypocrella* than with *Epichloë.*

DIMEROSPORIUM, *Fuckel.*

Perithecium superficial, globulose, without stroma, membranaceous-carbonaceous. Mycelium black, copiously suberustaceous, seated upon conidiophores. Asci short, 8-spored. Sporidia didymous, hyaline and brown.—Sacc. Syll. Fung. i. 51.

D. parvulum, *Cooke*, Grev. xx. 5. Perithecia minute, subglobose, membranaceous, with a brown sparse radiating mycelium, seated on irregular black spots. Asci globose, with a small basal apiculus. Sporidia elliptical, uniseptate, contracted at the septum, hyaline, 11-20 x 8 μ (possibly acquiring colour when mature).—*Cooke, l.c.*

Hab.: On leaves of *Trema aspera*, Yandina, *Field Naturalists.*

ASTEROMELLA, *Pass. and Thüm.*

Perithecia globose, minute, often phyllogenous, arranged in black, dense, star-shaped spots. Sporules ovoid or subcylindric, hyaline, continuous. Resembling *Asteroma* in habit, but has no genuine fibrillæ.—Sacc. Syll. Fung. iii. 182.

A. epitrema, *Cooke*, Grev. xx. 6. Spots on the upper surface, black, somewhat orbicular or confluent, bearing a mycelium of brown jointed threads. Perithecia minute, subglobose, membranaceous, seated on the mycelium. Sporules numerous, somewhat fusiform, or narrowly elliptical, continuous, guttulate, hyaline, 10-12 x 3 μ.—*Cooke, l.c.*

Hab.: On leaves of *Trema aspera*, Yandina, *Field Naturalists.*

ASTERINA, Lév.

A. reptans, *Berk. and Cooke.* Cuban Fungi. Mycelium slender, subreticulate, thickly covered by minute perithecia which are constructed of radiated cellules. Asceus clavate; sporidia oblong, very obtuse, subfusiform and 1-septate.—Sacc. Syll. i. 46.

Hab.: On *Eugenia* leaves, Harvey's Creek, *Bellenden-Ker Expedition.* In Cuba it was found on the foliage of *Piper.*

EUROTIUM, Link.

E. lateritium, *Mont.*, Syll. Crypt. n. 918; Cent. vi. n. 45 in Ann. 3, xi. p. 54; Sacc. Syll. Fung. i. 26; *Cooke* in Grev. xix. 92. Perithecia cellulose-membranous, yellow becoming ochraceous, immersed in an orange-yellow flocci. Asci 8-spored, sporidia 6 to 7 μ diam.

Hab.: On leaves of *Peperomia*, Mount Bartle Frere, *Stephen Johnson.—Baron Mueller*, Grev. l.c.

PESTALOZZIA, De Not.

P. Guepini, *Desm.* in Ann. Soc. Nat. 1840, xii. 182, tab. 4, fig. 1 to 3; Sacc. Syll. Fung. iii. 794. Amphigenous, black, scattered; spores fusiform, pedicellate, hyaline at each extremity, 3 to 4-septate; crowned with 3 or 4 very slender, hyaline, divergent setæ.—Cooke's British Fungi.

Hab.: On the foliage of *Alphitonia excelsa*, at Zillmere. In Europe this fungus is known as the *Camellia*-leaf fungus, from its being found on the leaves of that genus; it also infests the foliage of the following genera: *Rhododendron, Citrus, Prunus, Magnolia, Lagerstræmia*, and *Smilax.*

ENTYLOMA, *De Bary.*

Mycelium intercellular, not at all gelatinous. Spores solitary on the points or intercalary on the hyphæ, germinating like *Tilletia*, often gregariously crowded with a thick, hyaline, brownish or dark-brown, smooth or foveolate epispore often in several layers; promycelium filiform. Sporidia several, terminal, elongate, generally germinate. Conidia terminal in some species on short outspread hyphæ forming white clusters.—Sacc. Syll. vii. 487.

E. eugeniarum, *Cke. and Mass.*, Grev. xix. 92. Sori irregular dark-brown pustules, which are flattened, rounded or confluent and then angular ($\frac{1}{2}$-mm.) collected in large hypophyllous patches. Spores globose, oblong or angular (10-20 x 10-12 μ). Epispore very thick, even, pale-brown.—Grev. l.c.

Hab.: On leaves of a *Eugenia*, Harvey's Creek, *Bellenden-Ker Expedition.*

Order ALGÆ.

Family BATRACHOSPERMEÆ.

Diœcious. Thallus filamentous, articulate, branched, violet or violet-purple or bluish-green, covered with mucus. Primary filament of a single central series of cells, either furnished with densely conglobate tufts of verticillate fascicles of branches, or everywhere densely covered with simple or forked branches. Vegetation terminal.

BATRACHOSPERMUM, Roth.

(Name derived from the Greek *batrachos*, a frog, and *sperme*.)

Thallus moniliform, composed of a simple series of medullary cells, and a cortical accessory parallel series, clothed with subglobosely clustered fascicles of branches.

B. moniliforme, *Roth.* (Branches resembling necklaces.) From an inch to a foot in length, clothed with a more or less gelatinous mucus, violet-brownish, reddish-brown, purple, or bluish-green, profusely branched. Joints of the branches similar, oblong or clavate, outer ones sometimes setigerous. Internodes naked, or furnished with scattered accessory branches. Cellules 20 to 22 x 10 μ.—*Cooke*, Algæ.

Hab.: Dunwich Pumping Station, Stradbroke Island, *Dr. Thos. L. Bancroft.* This beautiful plant is commonly met with in Europe and other parts in swamp waters.

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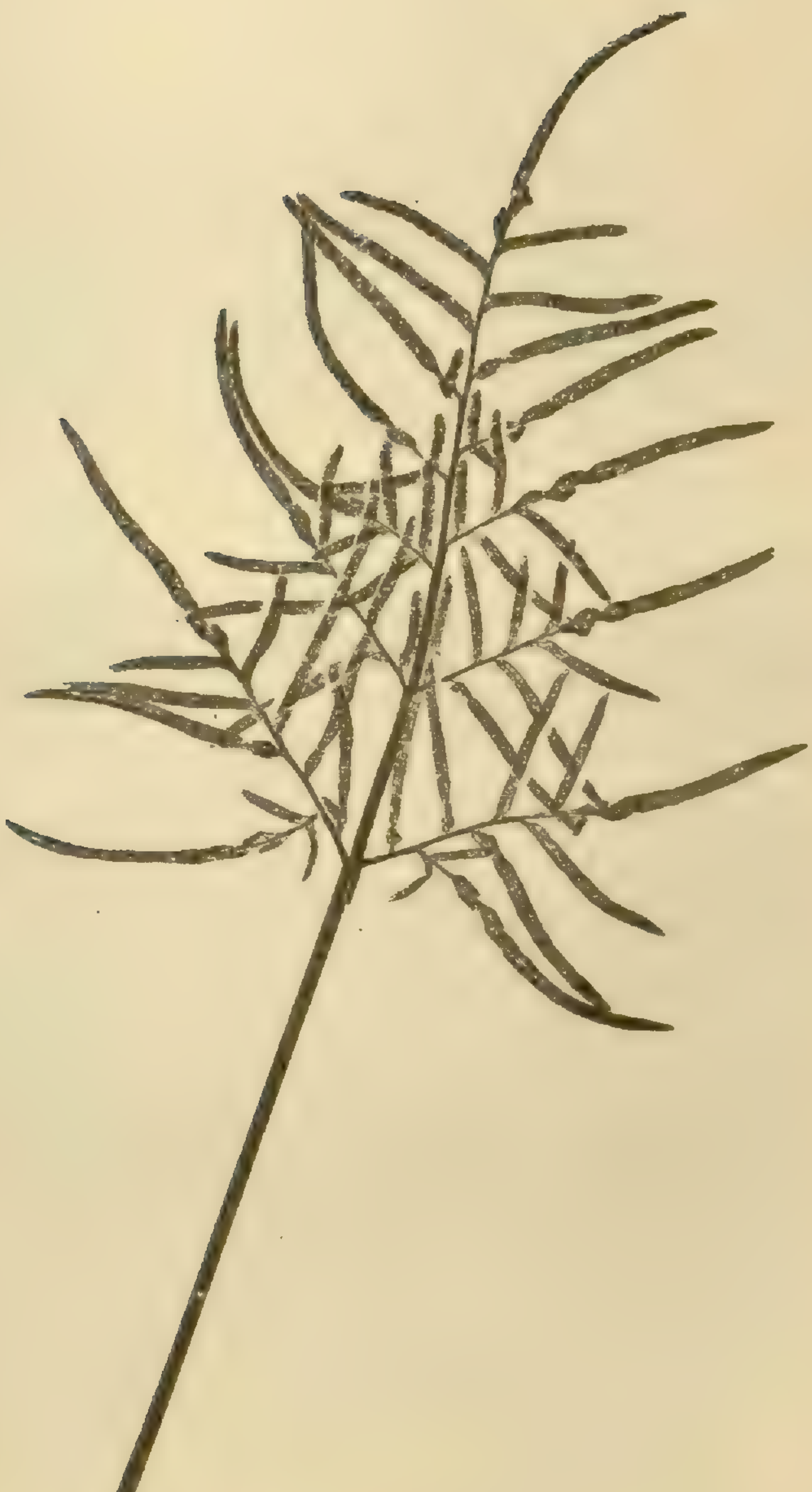
Asplenium Wildii, *Bail*

Asplenium Wildii, *Bail.*

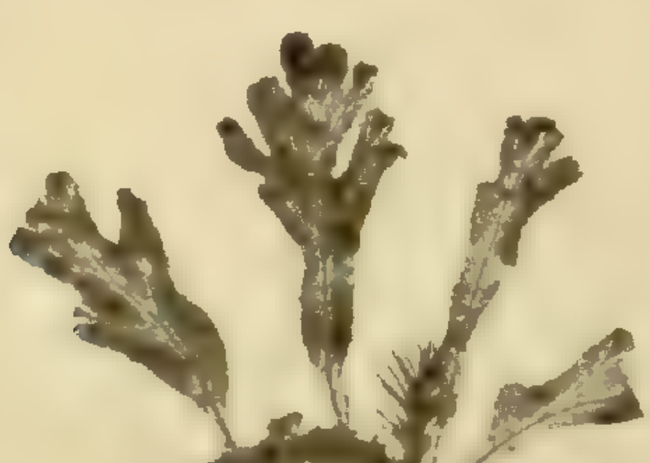


Cheilanthes caudata, *R. Br.*

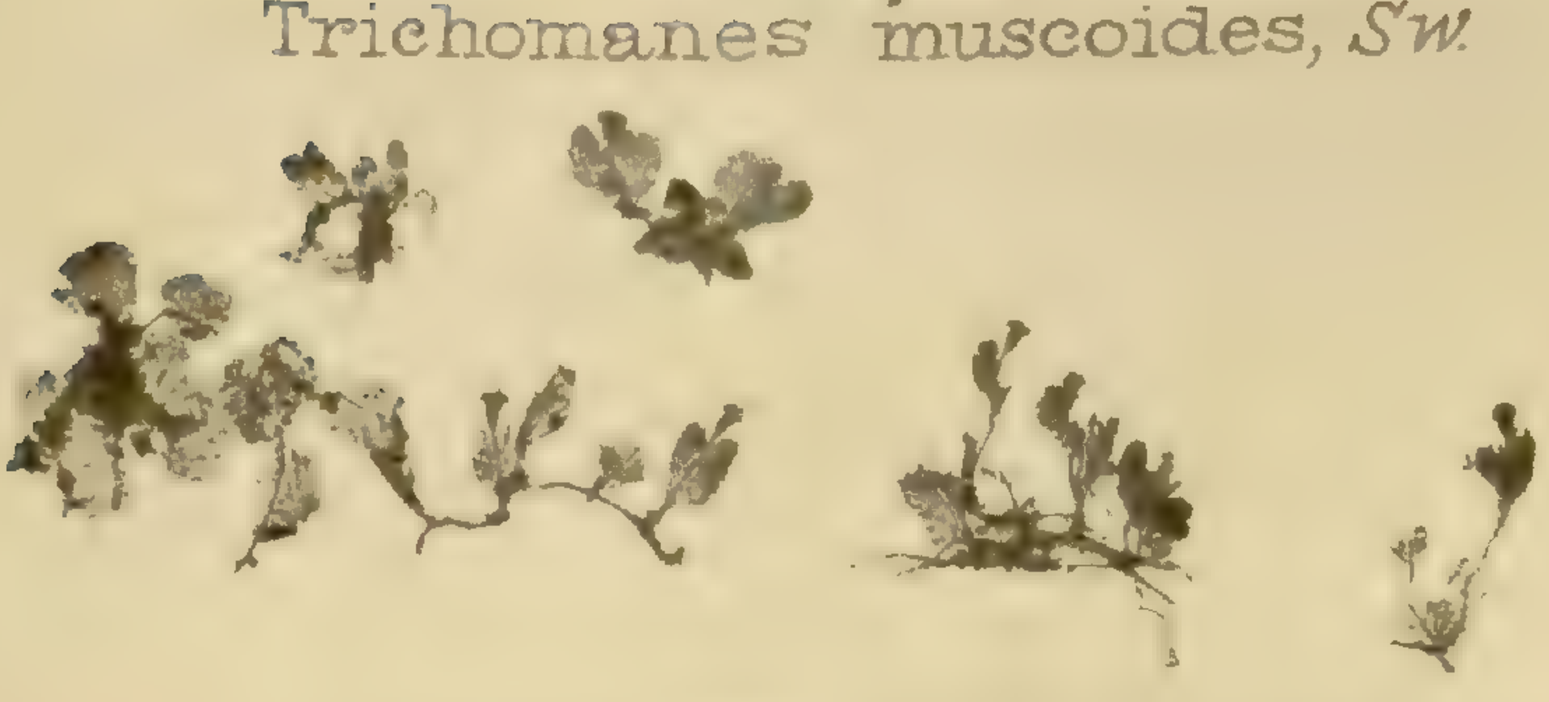
Polypodium superficiale V. australiense

Trichomanes Wildii, *Bail.*

Trichomanes Kurzii, *Bedd.*



Trichomanes muscoides, *Sw.*



Trichomanes Motleyi, *Bosch.*

Trichomanes pyxidiferum, *Linn.*
var.

Trichomanes rigidum var. laxum

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BULLETIN No. 18.

MAY, 1892.

BOTANY BULLETIN No. V.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S., C.M.P. SOC. OF GR. BRIT., ETC.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

BY AUTHORITY: JAMES C. BEAL, GOVERNMENT PRINTER, WILLIAM STREET.

1892.

NOTICE.

It will be seen from the additions recorded in this publication that our knowledge of the indigenous flora is gradually being extended. That the people are alive to the advantages of a knowledge of the native plants is fully proved by the great number of specimens sent in for determination; and in these pages contributors will find those plants amongst their collectings which have proved new to the Colony fully recorded. I would here remind correspondents that it is not only in the more distant parts of our Colony that fresh plants are likely to be met with, but even close at home; even at our very doors, in a Colony like Queensland, fresh or even new species may be looked for. This is borne out by the new plants recorded in the present Bulletin, some of which have been obtained within 100 miles of Brisbane. I would, therefore, ask that the lovers of plants in all parts of our Colony will spare a little time now and again to collect and forward to me specimens of the plants of their immediate neighbourhood, and if these are numbered and duplicates kept, I shall have great pleasure in returning names to numbers where such may be required. In replying to this request they will be helping to make known the riches of the Queensland flora. It would also be of further advantage if correspondents would, where possible, furnish me with the native or local names of the plants, and also what may be known of their properties. I would again express my thanks to those correspondents from whom I am constantly receiving specimens, and point out that although much has been done towards working up our native plants, much further requires to be accomplished before we can take a comprehensive view of the vast and rich flora of this part of the Australian continent.

F. M. B.

May, 1892.

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BOTANY:

CONTRIBUTIONS TO QUEENSLAND FLORA.

Order DILLENIACEÆ.

Tribe DELIMEÆ.

TETRACERA, Linn.

T. Cowleyana (n. sp.) (After E. Cowley.) A coarse climber, the branches appearing angular from the bark peeling, and rolling back from longitudinal fissures, chestnut-brown and scabrous. Leaves scabrous, ovate-lanceolate, often 6 in. long and 3 in. broad in the centre, the apex sometimes sharply acuminate; petiole 1 in. or more long, and often slender, hispid with appressed hairs, with which the costæ and primary nerves on the under side are usually clothed; the primary parallel nerves numerous, regular, extending beyond the margin in the form of mucronate teeth. Panicle scabrous, from 6 to 9 in. long, bracts narrow-linear-lanceolate, silky. Pedicals slender. Sepals obtuse, velvety, with ciliate edges, the inner ones twice the size of the outer. Petals veined 3 lines long, obovate, velvety, with the margin ciliate like the sepals. Filaments much dilated, and more or less bifid at the apex. The anther-cells thus being widely separated. Carpels usually 3, hirsute, $3\frac{1}{2}$ lines long; seeds black, glossy, enveloped in a fringed crimson arillus, which, when expanded, has a diameter of 4 or 5 lines.

Hab.: Herbert River, *H. G. Eaton*; Cairns, *E. Cowley*.

Order ZYGOPHYLLEÆ.

TRIBULUS, Linn.

T. occidentalis, *R. Br.*, in App. Sturt Exped. (So named from being first found in Western Australia.) A diffuse or prostrate plant, the branches densely tomentose-hirsute or woolly. The upper leaves opposite, the larger one of each pair with 8 or 9 pairs of leaflets, silky-hairy, the base oblique, the apex pointed, about 5 lines long and 2 lines wide Pedicels slender, $1\frac{1}{2}$ to $1\frac{3}{4}$-in. long. Sepals narrow, 6 lines long. Petals of a deep-yellow, exceeding an inch in length, cuneate, 6 lines broad at the upper end. Stamens 10, long as the sepals; anthers all perfect, oblong; ovary covered with long barbellate bristles; style glabrous, together with the ovary equaling in length that of the stamens. Cocci usually but 2 coming to maturity, each of which are about 7 lines long and 5 lines broad, and clothed by a dense covering of soft white silky hairs, and numerous long hairy-subulate spines, thus the extreme diameter of fruit, including spine, will often measure over $1\frac{1}{2}$ inches. The fruit examined not fully ripe.

Hab: Diamantina, *Dr. Thos. L. Bancroft.* The first specimens of this plant, Dr. Robt. Brown tells us, were gathered on the west coast of Australia, or on some of its islands, by the naturalists of the "Beagle." App. l. c. Mr. Bentham, Fl. Austr.

i., 289, says: "In J. McDouall Stuart's collection is a fragmentary specimen from Fink River, with a much larger flower, which may possibly be a variety of *T. hystrix*, but is indeterminable without fruit." Both these notices agree with the Diamantina plant, and differ in my opinion, sufficiently from *T. hystrix* to bear Dr. Brown's name as above.—F.M.B.

Order RUTACEÆ.

Tribe AURANTIEÆ.

CITRUS, Linn.

C. australasica, *F. v. M.*, **var. sanguinea.** Red-fruited Finger Lime. This differs from the ordinary form in colour of fruit only. This, however, being constant, it is better that the form should be known by a distinctive name. The fruit attains about 2 or 3 in. in length and ¾ in. in diameter, is of a blood-red colour, thin skinned, pulp sharply acid, and of a pink colour.

Hab.: Tambourine Mountain, *J. Pindar.*

It is much to be regretted that the indigenous species of this useful genus of fruits are not brought under cultivation. They bear fruit in abundance, which is juicy and of a sharp, pleasant acid flavour. For many years I have recommended the indigenous limes for stocks upon which the cultivated varieties might be grafted. The objection to this seems to be in the slowness of growth, and hardness of wood in the native species. This objection, however, cannot be taken to the species found at the Russell River, for in growth and general appearance it so resembles those in cultivation that at a casual glance it might be mistaken for a stray from cultivation. I would therefore strongly advise orange cultivators in tropical Queensland to obtain this species for stocks.

Order BURSERACEÆ.

Tribe BURSEREÆ.

BURSERA, Linn.

(Named after Joachim Burser, a disciple of Caspar Bauhin.)

Flowers polygamous or hermaphrodite. Calyx small, 4 to 6-partite or toothed, imbricate. Petals 4 to 6, short, patent at length, reflexed, usually valvate. Disk annular crenate. Stamens 8 to 12, nearly equal, inserted at the base of the disk. Ovary free, ovoid or subglobose, 3 to 5-celled; style very short; stigma 3 to 5-lobed; ovules 2 in each cell. Drupe globose or ovoid, with 3 to 5 pyrenes. Balsamiferous trees. Leaves alternate imparipinnate, or rarely 1-foliolate; panicle short-branched.

B. australasica (n. sp.) So far as at present known a small glabrous tree; leaves alternate, pinnate; leaflets 3 to 5, most frequently 3, lanceolate, entire, coriaceous, 1½ to 2½ inches long, obtusely acuminate; petiolules about 3 lines. When 3-foliolate the terminal pinna distant from the others, glossy on both sides, but the under paler than the upper; petiole about 1½ inches long, angular. Panicles in the upper axils rather numerous near the end of the branches, and scarcely exceeding in length that of the petioles, of few branches. No flowers seen, but from their remains at the base of the fruit they appear to be very small; calyx 4-partite, the lobes under half a line long, and somewhat triangular. Stamens 8, scarcely exceeding the calyx lobes; filaments very short; anthers lobed at the base, appearing sagittate. Drupe with purplish epicarp, oval, and showing more or less of 4 angles; endocarp hard, bony, with 4 very prominent ribs indicating the pyrenes or cells, 2 only seem to mature seeds.

Hab.: Eumundi, *J. F. Bailey and J. H. Simmonds.*

Order MELIACEÆ.

DYSOXYLON, Blume.

D. Pettigrewianum (n. sp.) Scrub Ironbark or Cairns Satinwood. (After the Hon. William Pettigrew, who has always taken a deep interest in Queensland timbers.) A tall, deciduous tree, with large umbrageous head; stem erect, often flanged at the base; bark reddish; wood deep-coloured towards the centre of stem. The young branches stout, containing a large proportion of pith; the bark rough, with lenticelles and the strong decurrent lines from the bases of the petioles. Leaves alternate, puberulent; leaflets opposite, lanceolate, 5 or 6 pairs, and a terminal one, which is the largest and about 9 in. long and 4 in. broad; all shortly petiolulate, more or less elongated at the apex, and rounded at the base; primary veins prominent, nearly parallel, often nearly opposite, from 12 to 20 on each side of the midrib; petioles short and sharply angular. Flower spikes erect, in the arils of the leaves, about 3 in. long and covered with a short grey pubescence. Calyx cupular, about $1\frac{1}{2}$ lines long, with 4 short sharp teeth, which are very deciduous. Petals 4, linear, 4 lines long, glabrous or slightly hairy on the back near the apex. Staminal tube $\frac{3}{4}$ the length of the petals, crenulate, glabrous. Anthers 8, oblong. Disk tubular, about $\frac{1}{2}$ as long as the staminal tube, sprinkled with a few minute hairs outside, densely hirsute inside, the mouth ciliate with longish hairs. Style and ovary hirsute, stigma large. Fruit pyriform, with 4 prominent acute angles, glabrous or nearly so, the outside marked by numerous white lenticelles; when ripe about $1\frac{1}{4}$ in. long, 4-celled or less by the abortion of one or more cell.

Hab.: Scrubs at the base of the Bellenden-Ker Range and the Barron River.

SYNOUM, A. Juss.

S. Muelleri, *C. DC.*, Monogr. Phanerog. i. 593. Description not to hand when 3rd. Suppl. to Syn. Ql. Flora was published. Branchlets glabrous. Leaves shortly petiolate, imparipinnate, 3-jugate, about 16 cent. long; leaflets opposite, petiolulate, elliptic-lanceolate, equal and acute at the base, the apex obtuse cuspidate, and glabrous on both sides, subcoriaceous, the superior leaflet attaining 9 cent. long and $4\frac{1}{2}$ cent. broad, the others smaller, secondary nerves fine. Panicle long as, or longer than, the leaf, the branches elongated, glabrous. Buds globose-ovate. Flowers on long pedicels. Calyx-teeth 5, ovate, glabrous. Petals 5, elliptic, acute, glabrous, the tube urceolate-cylindric, glabrous. Anthers 10, elliptic, glabrous. Ovary 2-celled, densely covered with yellow hairs, the style also hairy.—From *Casimir De Candolle, l.c.*

Hab.: Rockingham Bay.

Order CELASTRINEÆ.

HYPSOPHILA, F. v. M.

H. oppositifolia, *F. v. M.*, Vict. Nat. May 1892. (Referring to the leaves being usually opposite.) Leaves $1\frac{1}{2}$ to 3 in. long, on rather long petioles, mostly opposite, ovate-lanceolate, bluntly acuminate. Paniele many-flowered, cymose, terminal and axillary. Sepals connate towards the base. Petals ovate, beset outside with short appressed

hairs. Filaments much incurved, considerably longer than the anthers, stoutish, dark-purplish, hispidulous. Style very short, stigma much broader, depressed; disk and ovary glabrous. Fruit not seen.

Hab.: Mount Bartle Frere, *Stephen Johnson, F. v. M. l c.*

Order AMPELIDEÆ.

VITIS, Linn.

V. acetosa, *F. v. M.* Walsh River Grape. It appears to me that under this name two distinct species or forms of one species are confused in the few notices in which the plant or plants are referred to. But until full specimens of each are obtained they cannot be separately and satisfactorily described. Specimens of the plant to which I wish to draw attention have lately been received from Mr. T. R. Gardiner, of the Walsh River, who describes it as of herbaceous habit—that is, it makes annual growths. This agrees with Mueller's first account of the plant. Mr. Gardiner says that the root stock throws out long prickly shoots, upon which the flowers appear before the leaves. Bentham, in Flora Austr. i., 449, says that the young shoots and inflorescence are glabrous, or slightly hoary-tomentose. The specimens I have are densely tomentose. Bentham, l.c., says leaflets 5 to 7, pedate, petiolulate, or the central one nearly sessile, oblong or obovate-cuneate, obtuse, or rarely shortly acuminate, 2 to 3 in. long, or rarely longer, entire or bordered by small teeth or minute distinct serratures, narrowed at the base, herbaceous, but rather firm; pale beneath. Mueller, Fragm. ix., 126, says that some specimens which he had received from Mr. Gulliver were prickly-stemmed, and that the lateral pinnæ sometimes produced 3 or 4 leaflets. These are the points where Mr. Gardiner's specimens differ. At the top of the petiole are 3 petiolules of nearly equal length, the terminal one the shortest and bearing a single leaflet. The 2 lateral ones each bear from 3 to 5 palmately arranged leaflets each on short petiolules; the upper surface slightly tomentose, but the under side coated with a felt-like tomentum. With regard to the inflorescence, the cymes are pedunculate, dense, divaricate, or almost thyrsoid; the flowers often shortly racemose along the branches, on short pedicels. Flowers purple red, ovoid-globular, about 1 line long, glabrous. Petals separating; disk indistinct; style very shortly conical or scarcely any, with a truncate stigma. No flowers sent with Mr. Gardiner's specimens. Berries ovoid-globose. Of the fruit Mr. Gardiner says: "Grapes black, bunches in shape and appearance exactly like the common grape; bunches attaining 1 to 2 lb. weight; the best fruit obtained from plants found upon limestone country; flavour of berry pleasant, but sometimes, after eating a quantity, they leave a hot taste in the mouth, and the bloom seems to irritate the lips." From the account given by Mr. Gardiner, this fruit seems a desirable one to introduce into cultivation, by which means it might doubtless be improved as a fruit, and it would also be of value as a stock upon which other kinds might be grafted. The few seeds forwarded with the Walsh River specimens will be sown, and from these the usefulness of the plant can be proved. Baron Mueller (*Select Plants*, p. 255) recommended this vine for planting in Victoria, and says "the whole plant is pervaded with acidity, and proved valuable in cases of scurvy."

Hab.: Walsh River, *T. R. Gardiner.*

Order SAPINDACEÆ.

Sub-order SAPINDEÆ.

CUPANIA, Linn.

C. sericolignis, (n. sp.) Silkwood. Tree glabrous, said to produce a good timber; branchlets angular. Leaves alternate, pinnate, leaflets from 2 to 7, usually about 5, irregular both as to number and position upon the rhachis, oblong to ovate-lanceolate, obtuse or bluntly acuminate, the terminal one the largest, and attaining 6 in. in length and 2 in. in width, texture thin, sessile or on petiolules of 1 or 2 lines, the primary veins prominent on the underside, rather distant. Inflorescence (all male flowers on the specimens examined) lateral or axillary, often forming clusters of delicately slender racemes, about $1\frac{3}{4}$ in. long at the nodes on the branches below the leaves. Flowers white, minute when expanded, about $1\frac{1}{2}$ lines diameter. Sepals 5. imbricate, orbicular, unequal in size. Petals 5, larger than the sepals, oblong, with a tuft of ciliæ on either side near the base, otherwise glabrous. Disk annular, dark, glabrous. Stamens 8, subulate, of about equal length with that of the petals or rather shorter; the whole length of the short filament densely clothed with white soft scale-like hairs. Fruit not yet obtained.

Hab.: Mulgrave River, Bellenden-Ker Expedition; scrub about the Barron River, *E. Cowley.*

The specimens which I obtained on a creek off the Mulgrave River had rather longer racemose panicles, and the leaflets of the leaves were more sharply acuminate, with a paler underside, and were gathered off small-sized creek-side trees.

Order ANACARDIACEÆ.

Tribe SPONDIEÆ.

PLEIOGYNIUM, Engler.

(From the specific name given to the tree by Baron Von Mueller.)

Flowers diœcious. Calyx deeply 5-parted, segments ovate, imbricate. Petals 5, imbricate, twice as long as the calyx; obovate inserted below an annulate crenate disk. Stamens 10, inserted with the petals; filament filiform-subulate. Anthers ovate, versatile, cells longitudinal, their dehiscence introrse. Gynæceum abortive in the male flowers, in the female flowers of from 5 to 10 or 12 carpels. Ovary depressed, 5 to 10 or 12 celled, ovule, one in each cell, pendulous micropyle superior. Styles short, divergent; stigma spathulate, at length patent or reflexed; drupe slightly depressed, broadly turbinate, with the summit a little elevated and the lower part slightly angular; epicarp fleshy; endocarp thick, woody, shiny on the inside, 5 to 12-celled; cells securiform; seeds compressed, oblong, and slightly outwardly curved; embryo with oblong plano-convex cotyledous and short superior radicle. A tree, the branchlets terete, with the foliage clustered at their extremities; leaves impari-pinnate; petiole and rhachis slightly angular; leaflets membranous, oval, obtuse, narrowed at the base; lateral nerves patent; panicles axillary. From *Ad. Engler, diagnosis in De Candolle's Monogr. Phaner. iv.*, 255.

P. Solandri, *Engler, l.c.*; *Spondias acida*, Soland; *S. Solandri*, Benth. *Owenia cerasifera*, F.v.M.; *S. pleiogyna*, F.v.M. A tree of medium size; the branchlets and foliage from velvety pubescent to

nearly glabrous; leaves 3 to 7 in. long, on petioles of about 1 or 2 in. long; slightly angular as well as the rhachis; leaflets petiolulate, of from 2 to 5 pairs, and a terminal odd one, oval-oblong 2 to 4 in. long, and except the end one, which has a rather long cuneate base, very oblique at the base; the primary veins branched and often glandular, and forming a cavity in the axil at the midrib; panicles often slender, narrow and drooping, nearly as long as the leaves; the flowers in small clusters along the branches, male and bisexual; bracteoles ovate, minute, sessile: calyx-segments roundish, scarcely exceeding ½-line long; petals yellowish-green, about 1 line long, subovate, veined, glabrous above; filaments linear-subulate, 1 line long; styles conico-subulate, stellately spreading, recurved about ½ line long; fruit turbinate, from 1 to 1½ in. or more in diameter, often of a deep purple when ripe, and then with a juicy sarcocarp; putamen hard, rugose, outside, 12-celled, containing 1 seed in each cell. From *Mueller's and Engler's descriptions in part.*

The tree of which the above is a botanic description is that known in Queensland as the Burdekin Plum, or sweet plum, and by the Rockhampton natives as Rancooran, and at Port Curtis as Noongi. In the 1st vol. of the Flora Australiensis, Mr. Bentham placed it in Meliaceæ as ? *Owenia cerasifera*, as published previously by Baron v. Mueller in *Hooker's Kew Journal*, with a note that, "until the flowers have been seen, this species must remain in some measure doubtful," the fruit specimens alone being then known. At page 492 of this same volume, Mr. Bentham describes the same tree as *Spondias Solandri*, changing it from *S. acida*, as named by Solander in the Banksian Herbarium. These specimens were not in fruit, but he tells us that in the Banksian collection was a packet of drupes, named as belonging to this species, and described as such by R. Brown, and from this description there is little doubt but what they were the fruit of the above *Spondias*, and that it and *Owenia cerasifera* are identical. Baron v. Mueller, it would seem, has come to that conclusion, for we find *S. pleiogyna*, under which he described it in his Fragm. iv., and v., now merged into *S. Solandri*, in the last edition of his census of Australian plants. It seems to me better that the name given in De Candolles work, l.c., should be used for our Burdekin Plum, therefore a description is given in the present Bulletin. A change of name is always to be avoided where possible, but in the present instance it seems necessary. By an unfortunate oversight C. De Candolle, Monogr. Phaner., i., 596, gives a description from the Flora Austr., i., 386, omitting the note of interrogation, of *Owenia cerasifera*, F.v.M., which name had been changed to *Spondias pleiogyna* twelve or fourteen years before.– *F. v. M. in Fragm. IV.*, 78, *and V.*, 177.

Order LEGUMINOSÆ.

Tribe GALEGEÆ.

MILLETTIA, W. et Arn.

M. Maideniana (n. sp.) (After J. H. Maiden, F.L.S., Curator of the Technological Museum, Sydney.) Branchlets striate and clothed with appressed silky-hairs. Leaves about 6 in. long, petioles slender; leaflets 11 to 13, narrow, oblong or lanceolate, the largest about 2 in. long, ½-in. broad, on petiolules under 2 lines long, which with the midribs and rhachis are covered with stiff appressed setaceous hairs. Stipules fugacious, and all fallen from the specimen examined: stipellæ minute, setaceous, hairy, persistent at the upper leaflets: upper surface of leaflets dark-green, the under pale-coloured; reticulation very fine and close, but scarcely visible except with the aid of a lens. Inflorescence in terminal panicles about 7 in. long, the branches racemose, bearing more or less scattered purple flowers. Pedicels about 4 lines long, hairy. Calyx silky, about 2½ lines long, deeply lobed. Standard ½ to nearly ¾-in. broad, much broader than

long; grey, with silky hairs on the back, the face deep-purple and bearing a semicircular wing-like callosity just above the very short claw; wing and keel petals falcate-oblong, free except near the apex. Upper stamen quite free, with a callous swelling about a third up where it comes in contact with the others, the free ends of the joined ones filiform, all glabrous. Anthers minute. Ovary sessile, silky-hairy. Style inflexed glabrous. Pod 3 in. long, almost terete and 1¼ in. diameter, oblong, minutely tuberculose, thick, hard, and woody, the thin endocarp separating from the epicarp, with a follicular æstivation. Seeds 2, brown, hard, and polished; about 7 lines long and nearly as thick, irregularly angled; hilum as long as the seed.

Hab: Port Macquarie, communicated by Mr. J. H. Maiden. With the above was also a pod gathered at Murwillumbah, evidently belonging to the same species; this pod, however, was 7 in. long, tapering at each end; nearly terete, indehiscent slightly over 1 in. diameter, showing a slight pubescence at the contractions between the seeds. Seeds precisely like those in the short obtuse pod above described. The difference of the pods alone are quite sufficient to distinguish this species from the only other species met with in the northern parts of New South Wales and Southern Queensland—*M. megasperma*, the outside of whose pods closely resemble corduroy, the outer coating of the seeds also of this species cracks and peels off in fragments. It is probable that in a fresh or early state the pods of the new species may be pubescent, and that it had been rubbed off the two pods examined. I have more than once received loose seed of this new species from persons who had picked them up in the scrubs of our Southern border towards the Tweed River, so have given the plant in the Queensland Flora.

Tribe ACACIEÆ.

ACACIA, Willd.

A. melanoxylon, *R. Br.*; *Benth.*, in Fl. Austr. ii. 388. (Black wood or light wood of the southern colonies.) A small tree, except in Tasmania, where it attains a large size; glabrous, or the young shoots minutely pubescent; branchlets angular. Phyllodia falcate-oblong, or almost lanceolate, 3 to 4 in. long in the common varieties, ½ to 1 in. broad, obtuse or rarely acute, much narrowed towards the base, coriaceous, with several longitudinal nerves, with numerous anastomosing veins. Peduncles 3 or 4 lines long, few together in a short raceme, or sometimes solitary, bearing each a dense globular head of 30 to 50 or more flowers, mostly 5-merous, and often so closely packed in the head that the calyxes adhere. Calyx more than half as long as the corolla, thin, and shortly toothed. Petals connate above the middle. Pod elongated, flat, often curved into a circle, 3 or 4 lines broad, with thickened nerve-like margins. Seeds nearly orbicular; funicle very long, dilated and coloured from the base, very flexnose, more or less encircling the seed in double folds.—*Benth. l.c.*

Hab.: Gladfield, *C. J. Gwyther.*

A pubescent form of this species, so far as can be determined from the specimens sent me.

Order SAXIFRAGEÆ.

Tribe ESCALLONIEÆ.

POLYOSMA, Blume.

P. reducta, *F. v. M.*, Vict. Nat. June 1892. A small tree of about 25 ft. in height, with appressed hairs on the branchlets and petioles. Leaves mostly lanceolate, entire, gradually acuminate from 1¼ to 2½ in. long, almost suddenly passing into the slender petiole, almost

glabrous above, slightly puberulous beneath, the venulation much concealed. Racemes terminal and oftener axillary; pedicels very thin. Bracts and bracteoles minute at the upper end of the pedicel. Calyx-teeth very short. Fruit ovate-globular, slightly oblique, without longitudinal lines, its summit emerging from the calyx and somewhat pyramidal, about 2 lines long, on pedicels of about the same length; endocarp thinly cartilagineous, the spurious dissepiment longitudinally divisable into halves. Seeds 1 or 2, if 2 only one side turgid. Albumen oily, somewhat granular. Embryo minute, roundish. —*F. v. M. l.c.*

Hab.: Russell River, *W. Sayer*.

Order ROSACEÆ.

Tribe POTENTILLEÆ.

FRAGARIA, Linn..

Calyx persistent, with 5 bracteoles at its base; lobes 5, valvate in the bud. Petals 5. Stamens many, persistent. Carpels many, on a convex receptacle; styles ventral, persistent; ovule 1, ascending. Achenes many, minute, sunk in the surface of a large fleshy receptacle. Perennial scapigerous herbs, with creeping stolons. Leaves digitately 3, rarely 5, foliolate, very rarely pinnate or simple. Stipules adnate to the petiole. Flowers white or yellow, often polygamous.

F. indica, *Andr.*, Bot. Rep. t. 479; *Hook*, Flora. of Brit. Ind. ii. 343. Indian Strawberry. A more or less silky-hairy plant. Rootstock stout, with many long, slender prostrate stems. Leaves distant; leaflets 3 to 5, rarely 5, 1 to 1½ in. diameter, petiolulate or sessile; membranous, simply or doubly crenate, or toothed, or serrate; base cuneate, entire; nerves parallel. Petiole 1 to 5 in. long, very slender. Stipules leafy, toothed. Pedunceles very slender, equalling the petioles, naked. Flowers ½ to 1 in. diameter. Calyx-lobes ovate or lanceolate; bracteoles narrow or broad, often greatly exceeding the calyx-lobes, rarely quite entire. Petals obovate, cordate, yellow. Fruit spherical or oblong, bright red, spongy, insipid; achenes minute, obscurely pitted. —*Hook l.c.*

Hab.: Stafford-on-Kedron, *H. St. John Somerset*. This Indian plant has in some localities strayed from garden culture into adjoining pastures.

Order MYRTACEÆ.

Tribe LEPTOSPERMEÆ.

LEPTOSPERMUM, Forst.

L. wooroooncoran, *Bail.*, Rep. Bot. Bellenden-Ker Exped. 40. 1889. At the time of my visit to the Bellenden-Ker Range, flower were not obtainable. These have since been gathered by Mr. A. Meston, and thus I am enabled to complete the diagnosis of the species. Young growth silky; flowers few or solitary, terminating the branchlets. Calyx muricate, tube turbinate; lobes bluntly triangular, the upper part bearing a dense, woolly pubesence. Petals about 3 lines long, or twice as long as calyx-lobes, rotund, ovate and veined.

Hab.: Summit of Bellenden-Ker.

Tribe MYRTEÆ.

MYRTUS, Linn.

M. monosperma, *F. v. M.*, Vict. Nat. May 1892. (Referring to the solitary seed in each fruit.) A glabrous tree. Leaves attaining a length of 3 in., and a breadth of 1½ in.; petioles short, mostly ovate-lanceolate, bluntly protracted at the point, the base cuneate, margins somewhat undulate, upper surface dark-green and shining, less so on the under surface; primary veins rather distant, moderately prominent, oil-dots copious. Pedicels attaining 1 in. in length, capillary, few or several in the axils, some on compressed thin peduncles. Flowers hardly exceeding 2 lines long. Calyx-lobes 4, semiovate or semiorbicular, and conspicuously ciliolate. Petals almost glabrous, as long again as the calyx-lobes. Anthers orbicular or cordate-ovate, brownish. Disk glabrous. Ovary 2-celled. Fruit, nearly globular, about 4 lines diameter, usually 1-seeded; pericarp very thin, seed almost globular, nearly 3 lines diameter, testa smooth, shining, cartilaginous; embryo forming only 1 coil, but at one end somewhat protruding beyond the cuvature.

Hab.: Endeavour River, *W. Persich.*

Sap said to be extremely acrid.—*F. v. M. l. c.*

EUGENIA, Linn.

E. Luehmanni, *F. v. M.*, Vict. Nat. May 1892. (After G. Luchmann, Keeper of Phytologic Museum, Melbourne, Victoria.) A glabrous tree of about 20 feet. Leaves 1½ to 2½ in. long, and 1½ to ¾ in. broad; almost lanceolate, but gradually much protracted into a bluntish point. Panicles short, brachiate, their main divisions somewhat thyrsoid; pedicels very short. Flowers very small, rather crowded, 3 or 2, sometimes only 1, on the short ultimate peduncles. Calyx-tube hemi-ellipsoid, without any conspicuous angulation, densely glandular-dotted; lobes semiorbicular, much shorter than the tube. Petals whitish, twice the length of the calyx-lobes, free. The stamens and style much exceeding the petals. Anthers almost ovate. Stigma minute; ovary deeply sunk, 2-celled. Ripe fruit not seen.

Hab.: Mount Bartle Frere, *Stephen Johnson.—F. v. M. l.c.*

E. sordida (n. sp.) (Referring to the shabby appearance of tree.) A small tree with rather scanty foliage. Leaves under 3 in. long, and from ¼ to ¾ in. broad, subcoriaceous. narrow-lanceolate, obtuse. Petiole about 2 lines long, the midrib alone prominent. the primary veins looping near the margin. Flowers few, in short head-like racemes terminating lateral shoots; peduncle about 2 or 3 lines long; bracts oblong, minute; flowers sessile, or the calyx-tube, which is very open at the top, tapering into a very minute pedicel, about 2 lines long, glabrous; lobes somewhat orbicular, only slightly persistent. Petals slightly exceeding the calyx-lobes. Stamens under 3 lines long. No fruit seen.

Hab: Bellenden-Ker, about 4,700 ft. alt., *Exped.* 1889.

E. macoorai (n. s.p.) The name given by the natives to the South Peak of Bellenden-Ker. A small slender tree, the branches somewhat drooping. Leaves opposite on short petioles, narrow lanceolate, the apex elongated but not acute, 3 to 5 in. long, ½ to 1 in. broad in the middle, panicle terminal, the tops of the branches usually bearing

sessile flowers. Calyx-tube tapering much towards the base, somewhat hoary, about 3 lines long; lobes about 1 line long, very broad. Petals twice as long as the calyx-lobes; the oil-dots very prominent when dry. Stamens twice the length of petals. No fruit obtained.

Hab: Near the summit of the South Peak of Bellenden-Ker, *Exped.* 1889.

E. Johnsoni, *F. v. M.*, Vict. Nat. April 1892. (After Stephen Johnson.) A glabrous tree of about 40 feet in height; branchlets almost cylindric. Leaves seldom over 3 in. long and 1½ broad, often smaller, of firm consistence, mostly ovate-lanceolate, much contracted towards the blunt summit, gradually narrowed into a conspicuous petiole, rather prominently pinnate-veined; oil dots concealed. Inflorescence 2½ in. long or less; peduncles slender, axillary or terminal. Bractioles narrow, fugacious. Calyx before expansion clavate-ovate; tube smooth, passing gradually into the pedicel; lobes 4, rather large, almost semi-ovate. Petals not much larger than the calyx-lobes. Anther narrow-elliptic. Fruit one-seeded, from ½-in. to about 1 in. in diameter, red; pericarp rather thick, of subacid and aromatic flavour. Seed turgidly ovate, its colyledons one above the other. The unexpanded flowers resemble those of some eucalypti, and impart to this species a peculiar appearance.—*F. v. M. l.c.*

Hab.: Mount Bartle Frere, *Stephen Johnson.*

This is the species I alluded to in my report of the botany of the Bellenden-Ker Expedition as a probable form of *E. grandis*, but then no fruit was obtainable. —*F.M.B.*

E. apodophylla, *F. v. M.*, Vict. Nat. April 1892. (Leaves stalkless.) A tree of about 40 ft. high; branchlets prominently quadrangular, some parts quite membranously margined. Leaves 1 to 2½ in. long, firmly chartaceous, long-acuminate, with rounded base, sessile, pinnately thin-veined, oil dots much concealed. Flowers small, from 2 to 4 together between terminal leaves; peduncles none; united pedicels and flower-buds club-shaped; calyx passing gradually into the twice longer pedicel, punctular-scabrous. Petals 1¼ line, at first coalescent into an hemi-spheric lid, but some finally expanding. Stamens much longer than the petals, some 4 lines long; anthers roundish when open; style elongated; ovary sunk deeply. Fruit reddish.—*F. v. M. l.c.*

Hab.: Bellenden-Ker Range, *Wm. Sayer.*

E. hedraiophylla, *F. v. M.*, Vict. Nat. April 1892. (Referring to the want of stalk to the leaves.) Stature not recorded. Branchlets glabrous and prominently quadrangular. Leaves rather large, chartaceous, elliptic-lanceolate, gradually acuminated, with rounded base, almost sessile, veins faint, pinnate and immersed, oil dots copious but not conspicuous. Flowers small in ample branchiate panicles; peduncles from decurrent prominences, very quadrangular; flowers frequently ternate on the ultimate peduncles; pedicels extremely short or obliterated; calyx hemispheric-turbinate, slightly lobed or almost truncate. Petals hardly expanding. Anthers very minute, about as long as broad. Style capillary, thin; ovary much sunk. Fruit quite small, almost globular, one-seeded, terminated by a comparatively broad limb of thin structure, and separted from it by some constriction; pericarp very thin.—*F. v. M. l.c.*

Hab.: Mossman River, *Wm. Sayer*; Russell River, *Stephen Johnson.*

Order SAMYDACEÆ.

HOMALIUM, Jacq.

H. circumpinnatum (n. sp.) Shuttlecock Flower. (Named from the flowers resembling a miniature shuttlecock.) A tall glabrous shrub, with the branchlets closely dotted with lenticels. Leaves lanceolate or ovate-lanceolate, 3 or 4 in. long, $\frac{3}{4}$ to $1\frac{3}{4}$ in. wide in the centre, the margins often sharply toothed; petiole seldom over $\frac{1}{4}$ in. long; texture thin, coriaceous; primary nerves distant, reticulations fine and prominent. Racemes slender, terminal or in the upper axils, 3 or 4 in. long, sometimes once forked near the end, but the branches closely appressed to each other. Peduncle, pedicel, and rhachis puberulous; pedicels persistent about 1 line long, subtended by a setaceous bract nearly as long. Flowers grey, hairy, about 3 lines diameter, tapering into a long calyx-tube; calyx-lobes 5 or 6 linear. Petals 5 or 6, somewhat spathulate; stamens 2 or 3, opposite each petal; filaments hairy in the lower half, the ovary not so densely. Styles 5.

Hab.: Cairns, *E. Cowley*.

The present new species differs from *H. vitiense*, Benth., in its smaller stature, less hairy pedicellate flowers, and smaller setaceous bracts, than *H. brachybotrys*, F. v. M., in its larger flowers and greater number of stamens.

Order CUCURBITACEÆ.

MELOTHRIA, Linn.

M. Celebica, *Alfred Cogniaux*, in DC. Mon. Phan. iii. 625. Stems climbing, slender, very little branched, sulcate, and sparsely rough with tubercles. Leaves somewhat rigid, triangular-ovate, slightly trilobed, pale green, and roughly dotted on the upper side, densely villous beneath with grey hairs, margins crenato-denticulate, apex acute or shortly acuminate, 4 to 6 cent. long and almost as broad, the basal sinus very narrow. Tendrils slender, elongate, sulcate, slightly hairy. Peduncles densely villous-hirsute, 1-2 mill. long; male flowers fasciculate, female solitary. Calyx-tube shortly villous-hirsute, base rounded 4 mill. long, 2 mill. thick; teeth erect, subulate, 1 mill. long. Corolla very shortly villous, segments oblong, apex obtuse, 2 mill. long. Stamens-filaments $\frac{1}{2}$ mill. long; anthers narrow-oblong, shortly ciliate, base entire, apex shortly appendiculate, 2 to $2\frac{1}{2}$ mill. long. Fruit peduncle 5 to 6 mill. long, $2\frac{1}{2}$ mill. thick. Fruit fulvus, glabrous, smooth, $3\frac{1}{2}$ cent. long, $2\frac{1}{2}$ cent. thick. Seeds brown, ovoid-oblong, shortly attenuated at the base, rounded at the apex, 6 mill. long, 3 to $3\frac{1}{2}$ mill. broad, $1\frac{1}{2}$ to 2 mill. thick.—From *DC. Mon Phan. l.c.*

Order UMBELLIFERÆ.

Tribe AMMINEÆ.

AMMI, Linn.

(Name from *ammos*, sand: habitation of plants.)

Teeth of calyx obsolete or small. Petals obovate, with an inflexed point, emarginate, or with 2 unequal lobes; the exterior ones frequently larger. Fruit laterally compressed, ovate-oblong. Carpels with 5 filiform equal ribs; the lateral ones marginal. Interval with single vittæ, commissure with 2 vittæ, carpophore free, 2-parted.

Seed terete-convex, flattish on the face. Herbs with a fusiform root, and pinnately divided or many-parted leaves. Umbels compound, many rayed. Involucre many-leaved; the leaflets 3-cleft or pinnatifid. Involucels many-leaved; the leaflets undivided.

A. magus, *Linn.* Common Bishop's-weed. Stems 3 or 4 feet high, glabrous, Leaves pinnately divided; segments cartilaginous on the margin, acutely serrate; lower ones lanceolate; the upper ones many-cleft, linear.

Hab.: A European weed become naturalised in Southern Queensland.

Order RUBIACEÆ.

Tribe RONDELETIEÆ.

WENDLANDIA, Bartl.

(Named after Henry Ludov. Wendland.)

Shrubs or small trees. Leaves opposite or ternately worled; stipules entire or 2-fid. Flowers small, rosy or white, in terminal dense thyrsoid or panicled cymes, 2 or 3 bracteolate. Calyx-lobes 4 or 5, sub-equal, small persistent. Corolla tubular—salver—or funnel-shaped, throat glabrous or hairy; lobes 4 or 5, imbricate in bud. Stamens 4 or 5, between the corolla-lobes, filaments none or elongate; anthers versatile, exserted. Ovary 2 (rarely 3) celled; style filiform, stigma entire, 2-fid or 2-partite; ovules numerous, on small globose placentas adnate to the septum. Capsule small, globose, loculicidally, rarely septicidally, 2-valved, many-seeded. Seeds very minute, horizontal, compressed; testa membraneous, obscurely winged; embryo short, cylindric, in fleshy albumen.

W. basistaminea, *F. v. M.*, Vict. Nat. March 1892. (Name from the position of the stamens.) Branches almost silky pubescent with appressed hairs. Leaves opposite, attaining the length of 5 in., and breadth of 1¼ in., on short petioles or almost sessile, chartaceous, mostly ovate-lanceolate, pale or brownish on the under side, the primary nerves and veins, more or less hairy. Stipules almost deltoid, incised at the apex, soon deciduous. Panicles terminal, with the peduncle seldom over 2 in. long, the flowers in cymes or fasciculate, with a short pubescence. Pedicels about 3 lines long. Bracts minute, linear-semilanceolate calyx-lobes deltoid-semilanceolate, corolla hardly 3 lines long, with five oval lobes distinctly imbricate, nearly glabrous, shorter than the tube, slightly twisted before expansion. Stamens fixed close to the base of the corolla, and nearly as long as the tube; filaments short, anthers large, the base bilobed encluded, and as well as the style glabrous. Fruit about 1¼ line long, slightly protruding beyond the calyx-tube, pubescent at the top. Placentaries expanded into 2 narrow divaricate plates.—*F. v. M. l.c.*

Hab.: Russell River, *Stephen Johnson.*

Tribe PSYCHOTRIEÆ.

LASIANTHUS, Jack.

L. graciliflorus, n. sp. (So named from the slender flowers.) Stems erect, seldom or ever branched, 2 to 4 ft. high, more or less hairy. Leaves opposite, nearly sessile, ovate-lanceolate, acuminate, rounded or tapering at the base, 4 to 8 in. long, 2 to 2½ in. broad, softly hairy on the back, primary veins numerous, irregularly looping

within the margin, the smaller reticulations prominent on the underside. Stipules uniting within the petioles, broad with a prominent point. Flowers in sessile axillary clusters. Bracts and calyx purplish, about a line long, ciliate. Calyx-lobes imbricate. Corolla-tube 4 to 5 lines long, very slender, hairy inside, the lobes acuminate, twisted, imbricate, white, slightly over 2 lines long. Stamens 4, inserted at the top of the tube, the anther tips alone exserted. Fruit nearly globular, about 5 lines diameter, containing 4 cells or pyrenes.

Hab.: Tringilburra Creek, Bellenden-Ker Expedition, 1889.

Order MYRSINEÆ.

Tribe EUMYRSINEÆ.

EMBELIA, Burm.

(The Ceylonese name of one species.)

Flowers small, polygamous, mostly diœcious, white or greenish yellow. Calyx free, 5-4-lobed, persistent. Petals 5-4, free or slightly coherent at the base, elliptic, imbricate in bud (in subgenus *Rhynchostylis* contorted. Stamens 5-4; filaments more or less adnate to the petals; anthers ovate-oblong. Ovary ovoid or globose (in subgenus *Rhynchostylis* conical-beaked); style cylindric; stigma capitellate; ovules few. Fruit small, globose, 1 (rarely 2) seeded. Seed globose, base hollowed, albumen pitted subruminate; embryo curved, transverse. Shrubs, mostly climbing, or small trees. Leaves entire or toothed; petiole often margined or glandular. Racemes axillary or terminal, simple or compound, or flowers subfascicled, bracts small, except in *E. amentacea*, no bracteoles. (*Samara australiana* should be placed in this genus.)

E. Flueckigeri, *F. v. M.*, Vict. Nat. April 1892. (After Dr. Friederich Flueckiger.) A shrub of laurel-like aspect, though of rambling habit. Leaves on short corrugated petioles, attaining a length of 4 in. and a breadth of 1½ in., shining on both surfaces, texture firm, almost elliptic, blunt at the base, pelluced dots not plainly visible, margins entire, the veins closely reticulate, glabrescent. Panicle densely tomentose, numerously branched but short; tomentum brownish. Flowers in racemous clusters very shortly pedicellate. Bracts rather large, calyx-segments 5, rather long, narrow-elliptic. Petal about 3 lines long, very perceptibly dotted, much less pubescent than the calyx, tender membranous; stamens 5, about as long as the petals, linear-setaceous, hairy; anthers broadly cordate. Ovary and the lower portion of the style woolly. Fruit not seen.—*F. v. M. l.c.*

Hab: Russell River, *Stephen Johnson.*

Note.—*Samara australiana* has to be changed to *Embelia australiana. See* Benth. and Hook., Gen., Pl. I., 1240.

Order SAPOTACEÆ.

SIDEROXYLON, Linn.

S. arnhemica, *F. v. M.*, in Flora Austra. iv. 280. A tree about 25 ft. high, the head well shaped and affording good shade; diameter of trunk about 1 ft. with a greyish tessellated bark. Wood white, close-grained. Branchlets softly pubescent. Leaves ovate or oval-elliptical, obtuse, much tapering towards the base, softly silky-pubescent on both

sides, 2 in. to over 6 in. long, on petioles of above 1 in. Flowers in dense clusters in the axils or at the old nodes, softly pubescent, the pedicels shorter than the flower. Calyx-segments usually 6, very broad, orbicular, obtuse, concave, the 2 outer ones villous, the others less so and ciliolate, all rather above 1 line diameter. Corolla-lobes 6, truncate; filaments in the flowers examined filiform, with abortive anthers. Scales of the corolla-throat, small, linear. Ovary surrounded by a dense ring of hairs (6-celled?); ovules laterally attached. Style short, thick, glabrous. Fruit, green, smooth, and glabrous; when ripe, oval, about $1\frac{1}{4}$ in. or rather more long, flesh soft and juicy. Seeds 4 or 5, compressed, the hilum nearly as long as the seed; albumen not very thick; cotyledons oblong 3-nerved; radicle short.—*Flora Austr.* in part.

Hab: Musgrave, Cape York Peninsular, *Geo. Jacobson*, who recommends the tree for planting for shade. He says that cattle and horses are very fond of the foliage, and that in times of scarcity of feed this tree is cut down for fodder. There is no doubt but what the foliage is nutritious. We know that the inner bark of another species of this genus was at one time used for food by the natives of the Maroochie district.

Order APOCYNACEÆ.

Tribe ECHITIDEÆ.

WRIGHTIA, R. Br.

W. Baccelliana, *F. v. M.*, Vict. Nat. March 1892. (After Professor Baccelli.) Branches rather stout, somewhat loosely spreading, densely clothed with spreading greyish hairs. Leaves of a firm texture, from subcordate to lanceolate-ovate, seldom quite lanceolate, attaining 5 in. in length and 2 in. in breadth, above scantily but beneath more copiously hairy; primary veins prominent on the under side. Cymes axillary or terminal, the axillary ones usually in pairs, seldom above 1 in. long, hairy. Bracteoles narrow and pointed. Flowers rather small; calyx segments lanceolate, pointed, without conspicuous inner appendages, about 3 lines long. Corolla red, the tube pubescent outside, about the length of the calyx, much narrowed downwards, and constricted at its termination; lobes amply overlapping each other, glabrous, about equal in length to the tube, orbicular or cordate-rhomboid; corona divided into numerous linear or spathula-elliptic, glabrous segments. Stamens fixed about the middle of the corolla-tube, perfectly enclosed; filaments very short. Anthers free, yellowish, glabrous, gradually pointed, minutely 2-lobed at the base, a little over 1 line long. Style glabrous; stigma nearly as long as the style, ovate-conical, annular-turged at the base, bimucronulate at the apex. Fruit not yet collected.—*F. v. M. l.c.*

Hab.: Russell River, *Stephen Johnson.*

Order ASCLEPIADEÆ.

Tribe CYNANCHEÆ.

GOMPHOCARPUS, R. Br.

(From the club-shaped fruit.)

Calyx 5-parted. Corolla rotate, 5-parted, mostly reflexed. Corona 5-parted, erect or suberect, as long as the gynostege or much longer, complicate-cucullate, laterally compressed, the margins strongly inflexed,

the inflexion greatest above, where the angles are often salient, directed towards the stigma; apex either truncate or variously twisted. Anthers membrane-tipped. Pollinia compressed, pendulous, taper-pointed or truncate. Stigma pointless. Follicles ventricose, bearing soft shred-like processes. Seeds comose. Erect shrubs or undershrubs with opposite leaves. Mostly belonging to Africa.

G. fruticosus, *R. Br.* The Arghel of Syria. A tall shrubby plant, the branches pubescent. Leaves lanceolate-linear, mucronate, petiolate, glabrescent, several inches long. Flowers white, in pedunculate umbels. Corolla rotate. Corona attached to the gynostegium of 5 laterally compressed broad erect segments as long as the anthers, truncate at the top. Follicles inflated, membranous, covered with long soft processes.

Hab.: Monduran, *N. Walsh.*

An African plant which has spread as a weed in all the southern colonies; is now becoming the same in Queensland. Probably it will not be much of a pest here, as South African plants do not usually like our Queensland climate. Where this plant abounds it is considered injurious to stock, which is probably correct. It is said that the leaves of this shrub are used to adulterate the Alexandrian (Nubian) Senna.

Order SOLANACEÆ.

SOLANUM, Linn.

S. oligacanthum, *F. v. M.*, in Trans. Phil. Soc. of Vict. 1-19, and in Hook., Kew Journ viii. 167; Flora Austr. iv. 454; and Fragm. vi. 145. (Name referring to the few prickles.) A shrub. The branches, foliage, and inflorescence clothed with a close dense stellate tomentum. Prickles slender, straight, scattered, none on the leaves or calyxes. Leaves very shortly petiolate orbicular, or very broadly and obscurely cordate, obtuse, more or less undulate, thick, scarcely exceeding $\frac{1}{2}$-in. in diameter, tripli-quintu-plinervate. Flowers very few together in lateral racemes; the common peduncle often very short or attaining 1 in. in length; pedicels also short and slender, not exceeding when in fruit more than 3 lines. Calyx membraneous, cup-like; the lobes of very irregular size, reaching nearly to the base. Corolla densely tomentose, blue, deeply lobed; lobes broad and blunt, expanding to a little over $\frac{1}{2}$ in. in diameter. Stamens 5; filaments very short and slender; anthers glabrous, linear-oblong, about 2 lines long, opening by terminal pores. Berry globular, about 3 lines in diameter, brown, nearly or quite glabrous; seeds large, glossy, chestnut colour, the dried pulp amber-coloured and very bitter.

Hab.: Annandale, Eyre's Creek, *Dr. Thos. L. Bancroft.*

The above seems the first full description which has been published of this interesting species, and although I have retained Baron Mueller's name I consider there is scarcely sufficient distinction to separate the species from *T. orbiculatum*, Dun.

Order PEDALINEÆ.

Tribe MARTYNIEÆ.

MARTYNIA, Linn.

Sub-genus Carpoceras.

M. diandra, *Glox.* Tiger-claw or Devil's-claw. (Name referring to the two fertile stamens.) An annual with stout erect finely glandulose-pilose stems 2 to 3 feet high. Leaves round, cordate,

more or less repand. Flowers in short-axillary or terminal racemes or singly. Calyx-teeth ovate-lanceolate, subtended by 2 large foliaceous bracts. Corolla 1½ to 2 in. long, whitish; lobes 5, roundish, with yellow and purple blotches. Stamens 2, fertile. Capsule obliquely half-elliptical, rugose, coriaceous, with 2 short incurved sharp beaks dehiscing longitudinally by 2 valves, each bearing 4 thick ribs.

Hab.: Tropics of America, but now over-run many tropical and semi-tropical countries. Specimen received from Woothakata as a noxious weed.

Sub-genus Proboscidea.

M. fragrans, *Lindl.* (Flowers fragrant.) A plant 1 to 3 ft. high, clothed with glandular hairs. Stem terete, erect, flexuous. Leaves usually opposite, petiolate, cordate in outline, 3-lobed; lobes rounded, angulate-sinnate, the middle one the longest. Racemes terminal; flowers large and fragrant. Pedicels as long as the flowers. Calyx large, inflated, plaited; or striated; teeth short, furnished at the base with two appressed fleshy bracts. Corolla scarcely longer than the calyx; mouth oblique; limb of 4 rounded spreading lobes, the upper bifid. Colour purplish red, with yellow in the throat. Stamens 5, and with the style included. Capsule curved upwards, wrinkled, crested above, terminating in 2 incurved beaks, much longer than the capsule, and hooked at the end.

Hab.: A Mexican plant now become naturalised, and a noxious weed to the sheep farmer, but fortunately does not spread at a rapid rate.

Order LABIATÆ.

Tribe STACHYDEÆ.

LEUCAS, R. Br.

L. linifolia, *Spreng* Syst. ii 743; *Hook.* Flora of Brit. Ind. iv. 690. An erect plant of 2 or 3 ft. stems, smooth or scaberulous. Leaves 2 to 4 in. long, and rarely ¾ in. broad, linear or linear-lanceolate, obtuse, entire, or subserrate; petiole none, or on some plants attaining ½ in. Whorls of flowers axillary and terminal, ½ to ¾ in. diameter. Bracts setaceous, few and short. Calyx ¼ to ⅓ in., obovoid, the upper lip projecting, acute, 3-toothed, lower 2-fid, of a pale colour below, not striate above, sometimes spinescent, corolla white, nuts smooth, angular.

Hab.: This Indian plant has become a weed about Kamerunga, *E. Cowley.*

The plant has a pleasant aromatic smell, and its flowers are used by the Brahmins to decorate their deity Iswara, according to Roxburgh.

Order MONIMIACEÆ.

MOLLINEDIA, Ruiz et Pavo.

M. subternata, (n. sp.) (The leaves often appearing as in whorls of three). A tall shrub or small tree, with long dependent branches, which, with the petioles, midrib, and primary nerves, are clothed by a greyish tomentum. Leaves in whorls of 3, 1 of which is often placed very slightly lower than the other 2, broad-lanceolate, 3½ to 5½ in. long, 1½ to 2½ in. broad, tapering or slightly rounded at the base, elongated to a sharp apex, which is usually furnished with a bristle-like point, glabrous except for the hairs upon the nerves and veins; petiole slender, about ½ in. long. Peduncles axillary, slender, about 1¼

in. long, bearing 2 spreading branches at the top, each bearing 1 or more pedicellate flowers ; receptacle hairy. Carpels 7 or less, shortly stipitate, roundly oval, about 4 lines long, hairy, but becoming nearly glabrous when ripe. Flowers not yet obtained.

Hab. : Freshwater Creek,near Cairns, *E. Cowley.*

M. macooraia, (n. sp). (Name, the one given to the South Peak of Bellenden-Ker.) A tall shrub or small tree, quite glabrous except the inflorescence ; leaves coriaceous, smooth, lanceolate, on very short thick petioles, 2 or 3 in. long by 1¼ in. wide in the middle; margins quite entire, the apex more or less elongated ; lateral veins numerous and almost parellel. Peduncles terminal or becoming lateral from the growth of the shoot, enlarged under the receptacle, sometimes a common very short peduncle bearing 2 branches, but usually single. Receptacle hairy, carpels 4 to 12, ½ in. or more long, oblong, nearly or quite sessile. This plant somewhat resembles *M. Wardellii*; but the fruit and foliage differs too much to allow of its being placed under that species.

Hab. : Bellenden-Ker Range up to the summit of the South Peak, 5,000 feet.

M. angustifolia (n. sp.) A tall shrub or small tree, quite glabrous. Leaves prominently veined, like those of *M. Huegeliana*, narrow, lanceolate, attaining the length of 5 in., and at the widest part not over 1¼ in., attenuated towards each end; apex very blunt; margins undulate and more or less toothed; petiole very short. Peduncles axillary, about ½ in. long, quite slender, bearing a single, or, when forked, 2 or more flowers. Receptacle and carpels glabrous.

Hab. : Bellenden-Ker, at about 3,000 or 4,000 ft. elevation. I would not venture to name from such imperfect material were it not in the hope that a short notice may enable persons visiting the locality to identify the plants and collect those portions wanting to complete the diagnosis.

Order LAURINEÆ.

Tribe PERSEACEÆ.

BEILSCHMIEDIA, Nees.

B. lachnostemonea, *F. v. M.*, Vict. Nat. May 1892. (Referring to the stamens being woolly.) Leaves mostly ovate or elliptic-lanceolate, protracted into a short blunt point, glabrous, closely reticulately veined on both sides, shining. Panicle beset with minute appressed hairs. Sepals and petals almost of equal length, nearly oval, connate towards their bases. The 6 stamens of the first rank somewhat shorter than the sepals and petals, the 3 of the second rank still shorter, the filaments all brownish-lanuginous ; staminoides 3, very short. Pistil in staminate flowers narrow-conic, glabrous, with a minute stigma.

Hab. : Russell River, *W. Sayer—F. v. M. l.c.*

ENDIANDRA, R. Br.

E. Cowleyana (n. sp.) A scrub tree usually about 70 ft. in height, with a somewhat smooth bark, and hardish, reddish wood. Branchlets rather slender, glabrous, except the young growth. Leaves ovate-lanceolate, shortly and bluntly acuminate, 2 to 2½ in. long, on petioles about 3 lines long, quite glabrous, the primary nerves few and distant, the reticulation fine but prominent on both sides. Panicles terminal or in the upper axils, narrow, 2 or 3 in. long, the branchlets

puberulent. Bracts hairy, lanceolate, larger than the flower, but falling very early. Perianth hairy outside, very minute, pedicellate, scarcely over a line in diameter when expanded, the 3 fertile stamens prominent, with broad ciliate filaments, staminodia also hairy, ovary glabrous.

Hab.: Scrubs near Barron River, *E. Cowley*.

E. Lowiana (n. sp.) (After the Messrs. Low, of Maroochie, who for many years have rendered valuable assistance in collecting native plants of the Maroochie district.) A small-sized glabrous tree. Leaves lanceolate, the apex sometimes somewhat elongated, 3 to 5 in. long; petiole 4 or 5 lines long, slender; primary nerves very oblique, distant, and only about 4 on each side of the costa; the reticulation fine, close, and prominent between them, on both sides of the leaf; texture thin. Flowers not seen. Fruit globular, but showing more or less of a point at each end, about $1\frac{1}{4}$ to nearly $1\frac{1}{2}$ in. in diameter, when fresh of a rich red color.

Hab.: Maroochie (Yandina), *J. A. Low*; Eudlo, *Field Naturalists*.

The fruit resembles that of *Cryptocarya australis*, Benth., somewhat in colour and shape, but is much larger, and the foliage is quite distinct from that or any other Australian species of the order.

E. dichrophylla, *F. v. M.*, Vict. Nat. May 1892. (Referring to the two-coloured leaves—upper surface dark green, under pale.) A tree of about 40 feet, the branchlets silky. Leaves ovate-lanceolate or almost ovate; 2 to 5 in. long, $1\frac{1}{3}$ to 2 in. broad, shortly acuminate. Dark green on the upper, paler on the lower surface, and there bearing a slight silkiness; rather strongly keeled; primary veins thin and devoid of conspicuous foveoles at their axils; venules reticulate; petioles rather short. Panicles usually much shorter than the leaves, axillary and terminal, slightly silky. Bracts rather conspicuous, ovate-lanceolate. Flowers very small on extremely short pedicels. Sepals somewhat larger than the petals, with these connate below the middle and persistent; filaments extremely short. Fruit, when fully developed, about 1 in. long, black, narrow, ellipsoid; pericarp very thin.

Hab.: Russell River, *Stephen Johnson—F.v.M.l.c.*.

E. exostemonea, *F. v. M.* Vict. Nat. June 1892. (Stamens exserted.) Branchlets and petioles thinly brown-tomentose. Leaves on rather short petioles, attaining 5 in. in length and $1\frac{3}{4}$ in. in breadth, mostly ovate-lanceolate, chartaceous, both sides shining, but slightly paler green beneath, with tomentose nerves, the reticulation close and conspicuous. Panicles axillary and terminal, much shorter than the leaves, often numerous, the peduncle and pedicels with brown appressed hairs. Flowers very small. Calyx and petals brownish, paler towards the margin, nearly glabrous; calyx-lobes semi-ovate, somewhat longer than the petals. Stamens glabrous, with 2 lanceolate appendages at the base, thin upper portion exserted. Style rather conspicuous, as well as the ovary glabrous; stigma minute. Fruit large, globular.—*F. v. M. l. c.*

Hab.: Daintree River, *Theod. Pentzke*.

CINNAMOMUM, Blume.

C. Oliveri (n. sp.) (After Professor Daniel Oliver, F.R.S.) A tall tree, glabrous, except the inflorescence, trunk erect, bark smoothish, rather thin and fragrant. Leaves opposite or nearly so,

lanceolate, attaining about 8 in. in length, and then scarcely over 1½ in. broad in the widest part, colour pale, the apex blunt or minutely emarginate, on petioles of about ½-in. which are flattened, the upper surface glossy, the under surface of lighter colour, midrib flattish, the primary lateral nerves very oblique, few, the basal pair faint, and very near the margin until lost in the reticulation about half way up the leaf. Panicles slender, terminal, and in the upper axils, 2 or 3 in. long, of few branches, hoary or velvety hairy, branches few, with usually 2, 3, or 4 pedicellate flowers at the end of each branchlet. Perianth hairy on both sides, as are also the broad filaments of the stamens. Stamens all shorter than the perianth. Ovary and style glabrous; stigma peltate. The only fruit seen was much deformed by gall insect and fungus.

Hab.: Maroochie, where it is known as the "Sassafras Tree."

From imperfect specimens I thought this tree only a form of Bentham's *Beilschmiedia obtusifolia*, and under which name its wood and bark have been noticed in my catalogue of Queensland Woods, No. 315. Professor D. Oliver, of the Kew Herbarium, to whom I sent specimens of the bark for the museum, and also herbarium specimen, pointed out to me my mistake, and hinted at the probability of its being a *Cinnamomum*, which, from the examination of somewhat better specimens, I think is the case and record it as above, although even now the material is but imperfect. So far as at present known the tree is only met with in the scrubs of the Maroochie River. Of the bark, the late K. T. Staiger said it contained a tannin similar or identical with cinchona tannin; the amount, seven and a-half per cent. One ton of the dry bark yields 770 oz. of oil.

When on the summit of Bellenden-Ker, in 1889, one of the party brought to the camp, on the South Peak, a shoot of a probably new *Cinnamomum*, which, judging from the foliage alone—for no flowers or fruit were obtained—closely approaches *C. Wightii*, Meissn. The branchlet was 4-angular, leaves opposite or sub-opposite, ovate to ovate-lanceolate, from 1 to nearly 3 in. long, on flattened petioles of 3 or 4 lines long, stoutly coriaceous, 3-nerved, the lateral ones vanishing at a little more than half way up the leaf, the reticulation somewhat obscure; upper surface glossy, under surface whitish. In the event of its proving new, I would recommend its being named *C. propingnum*, from its near resemblance to *C. Wightii and C. ovalifolium*.

Order PROTEACEÆ.

HELICIA, Lour.

H. Whelani, *Bail.*, Rep. Bot. of Bellenden-Ker Exped. 55, 1889. At the time of my visit to the Bellenden-Ker Range flowers were not available. These I have received lately from Mr. A. Meston, so take the opportunity of filling up the description of this most interesting tree. Panicles erect, terminal, puberulous, numerous, starting from a whorl of leaves. Peduncles slender, 3 or 4 in. long, branches in 1 or 2 whorls of 3 to 9, pedunculate, spike-like racemes 1½ to 2½ in. long, including the peduncle, which is about one-third of the length. Flowers scattered. Pedicels free, which, with the rhachis, is densely covered by short, white hairs, about 1 line long. Perianths would appear from the dried specimen to be white, slightly longer than the pedicels, glabrous, or with a few scattered white hairs on the outside, revolute to the base. Filaments flat, inserted near the base of the perianth segments. Anthers with prominent gland-like connectives. Hypogynous glands united, forming a cup. Ovary clothed with white hairs; style angular, glabrous.

Hab.: Scrubs about the Bellenden-Ker Ranges.

MACADAMIA, F. v. M.

M. Youngiana, *F. v. M. and Moore.* Having just received fruit specimens of this large, straggling shrub from Eumundi, I give here a description of the fruit, which will complete the diagnosis of the plant. Fruit vermilion, from globose to oval, and more or less pointed at each end, attaining $1\frac{3}{4}$ in. long and $1\frac{1}{2}$ in. diameter, indehiscent, slightly pubescent; suture prominent. The fruit becoming uneven or rugose in drying; exocarp somewhat fleshy and quite free from the seed, which latter is globose and only covered by a thin, felt-like integument.

Hab.: Yandina and Eumundi scrubs.

The fruits of this plant have been suspected of poisonous properties.

Order SANTALACEÆ.

SANTALUM, Linn.

S. lanceolatum, *R. Br.*, **var. angustifolium,** *Benth*, in Flora Austr. vi. 214. An erect shrub of 8 or 10 feet. Leaves narrow-lanceolate, often with a fine incurved point, 2 or 3 in. long, on slender petioles of about 3 or 4 lines. The fruit oblong with the circular scar near the summit.

Hab.: Diamantina, *Dr. Thos. L. Bancroft.*

Order EUPHORBIACEÆ.

Tribe PHYLLANTHEÆ.

PHYLLANTHUS, Linn.

P. hypospodius, *F.v.M.*, Vic. Nat. March 1892. (Referring to the grey colour of underside of leaves.) A glabrous shrub, of about 14 ft. in height. Leaves also distichous, entire, attaining 4 in. in length and 2 in. in breadth, ovate or elliptic-lanceolate, on short petioles, thinly veined, upper surface dull-green, whitish-grey on the underside. Sepals pale-coloured. Staminate flowers minute, on very short pedicels, each cluster of flowers containing one or two pistillate ones of larger size. Outer perianth-segments almost ovate, inner ones more orbicular and slightly longer. Stamens 6; anthers free, roundish, and nearly as long as the filaments. Style, hardly any stigmas 3, channelled or flattened, undivided, finally rigid. Fruit about 4 lines in diameter, much longer than the perianth-segments, brownish outside. Seeds nearly 2 lines long.—*F v.M. l.c.*

Hab.: Russell River, *Stephen Johnson.*

Order ORCHIDEÆ.

DENDROBIUM, Swartz.

D. teretifolium, var. aureum. Branches long, slender, drooping. Leaves 1 to $1\frac{1}{2}$ feet long, with a diameter of from 1 to $1\frac{1}{2}$ lines. Flowers about 5 or 6 in a raceme, of a deep golden yellow, except at the base of each segment and the spur, which is of a more or less deep purple. Segments very narrow, about $1\frac{1}{2}$ in. long. Labellum about the same length, the middle lobe elongated into a long filiform point; plates of disk 3, undulate, purple; lateral lobes short, the margins not undulate on the edges. Column short, wings white. Anther lid rosy-pink. Time of flowering October, at both habitats.

Hab.: Richmond River, *John Geary*; Killarney, *J. F. Bailey.*

Order FILICES.

As the lithograms of Queensland ferns will be issued simultaneously with the present Bulletin, and there being no descriptions given with the plates, I give here all that is wanting to complete the literature on the subject to date.

OPHIOGLOSSUM, Linn.

O. vulgatum, var. gramineum, *Bail.* Rhizome tuberous. Fronds from 1 to 2 in. high; the sterile portion narrow-lanceolate, ½ to ¾ in. long; fertile spike ¼ to ½ in. long.

Hab.: Frequently met with on stony ridges in Southern Queensland.

O. vulgatum, var. minutum, *Bail.* Rhizome tuberous. Fronds 1 to 3 in. high, the sterile portion petiolate, lamina roundish or almost rhomboidal, seldom attaining a diameter of 3 lines; fertile spike narrow, sharply pointed, about ½ in. long.

Hab.: On grassy land about the Herbert River.

LINDSÆA, Dry.

L. ensifolia, *Sw.*, **var. heterophylla,** *Benth.* In this variety, although not constantly so, the pinnæ are divided wholly or partially into numerous small rounded pinnules or segments.

Hab.: Northern Queensland.

ASPIDIUM, Swartz.

A. eumundi, *Bail* (n. sp.) (So named from locality where specimens were gathered.) Rhizome slender, more or less hairy, often very intricate, forming dense, matted masses, upon damp rocks, the fronds thus very numerous, and not unlike the moss *Cyathophora pleridioides*, 1 to 2 in. long, with the pinnæ not close, and only 1 or 2 lines long; these are never found bearing sori. From these moss-like masses proceed filiform stems, which creep up the adjoining trees or shrubs, the fronds on which are somewhat distant, narrow-lanceolate, in outline, often falcate, 3 to 6 in. long, stipes very short or none; the rhachis clothed by soft, white hairs and distant brown scales. Pinnæ oblong, the centre ones 3 to 6 lines long, from which they diminish in size towards each end, the apical ones being only about ½ line in diameter, and the basal ones but little larger, all softly hairy, the lower margin entire, upper crenulated, base truncate, and parallel with the rhachis, with a more or less prominent auricle on the upper side; costular vein flexuose nearer the lower than the upper margin, veinlets often shortly forked. Indusium large for the size of the frond; orbicular reniform, persistent.

Hab. Condamine, *C. H. Hartmann*; Tallebudgera, *J. F. Shirley*; Eumundi, *J. F Bailey, and J. H. Simmonds.*

The Condamine specimens were very imperfect. I had therefore kept them with *A. ramosum*, waiting for the more perfect specimens now to hand from Eumundi. By reference to Plate 126 of my Lithograms it will be seen readily how very distinct this new species is from all others of the genus.

A. pteroides, var terminans, *Bail.*, Rhizome creeping. Fronds tall. The veins more or less covered by a short, somewhat golden-coloured hoary pubescent and simple white hairs. Pinnæ

membranous, about 8 or 12 in. long and 1 in. broad, the apex finely acuminated, the terminal one deeply pinnatifid with numerous narrow lobes, sinuses open and much nearer the costule than the apex of lobes. Sori very few, often only 3 or 4, and confined to the apex of segment. Indusium orbicular-reniform.

Hab.: Tropical Queensland.

A. Molle, *Sw.* On Plate No. 132 is represented a peculiar growth of this species found on Stradbroke Island; most of the plants produce fronds with very blunt pinnæ, similar to that of which a portion is shown, but here and there may be noticed fronds of the ordinary form.

POLYPODIUM, *Linn.*

P. (Drynaria) quercifolium, *Linn.* From specimens to hand I am fully convinced that two species or forms of the above are indigenous to Queensland, as stated in my "Queensland Ferns," pp. 45 and 46. In my subsequent works, however, I have followed the Flora Austr. and merged them into the one Linnean species *P. quercifolium.* No grower of ferns would allow this, so to meet all objections I now place them as forms which may be distinguished as under:—

P. (Drynaria) quercifolium, *Linn.*, **var. normale.** Scales of the rhizome bright glossy-brown, $\frac{1}{4}$ to $\frac{1}{2}$ in. long, narrow-lanceolate, fimbriate, cordate at the base. Fronds somewhat membranous. Sori rather large, in 2 rows between and parallel with the costules, slightly immersed, and forming on the upper side of frond prominent pustules.

Hab.: Musgrave, Cape York Peninsula, *Geo. Jacobson.*

P. (Drynaria) quercifolium, *Linn.*, **var. Linnæi.** Scales of the rhizome about 1 or 2 lines long, broadly-ovate, with a short acumen from a peltate base. Fronds very rigid. Sori small, scattered, copious, and not showing pustules on the upper side of the frond.

Hab.: Common along the tropical coast.

For all other descriptive characters of these *Drynaria-Polypodiums* see Synopsis of the Queensland Flora, p. 718, where also it will be observed that in my remark on that lovely variety *P. r. Vidgeni*, that I considered the large fronds with laciniate non-articulate pinnæ only to be an extreme green-coloured form of the brown, stipular, usually sessile fronds, which the present plant produced also; and that should these green ones bear sori, and the pinnæ then not be found to disarticulate from the rhachis, *P. rigidulum* would have to be reduced to a form of *P. quercifolium.* This question has been lately settled by fronds brought from tropical Queensland by Mr. C. J. Wild, of *P. r. Vidgeni*, some of which were fertile, and the lower at least, if not the others, disarticulated from the rhachis, although very tardily. On Plate 164 of Lithograms of Queensland Ferns, is represented the usual form of the brown, sessile, stipular frond produced by *P. rigidulum* and *P. quercifolium*, and all their varieties, while on Plate 165 is represented an extreme form of the same.

ACROSTICHUM, Linn.

A. sorbifolium, *Linn.*, **var. leptocarpum.** Sterile specimens of this tropical fern were gathered by J. F. Bailey and J. H. Simmonds at Eumundi, in May, 1892. This is the first time of its being met with out of the tropics growing in a wild state.

Order MUSCI.

CAMPYLOPUS, Bridel.

C. Whiteleggei, *C. M.*
Hab. : On rocks, Stanthorpe.

BRYUM, Linn.

B. humipetens, *C. M.* (n. sp.)
Hab. : Gladfield, *C. J. Gwyther.*

HEDWIGIA, Ehrhart.

H. Novæ Valesiæ, *C. M.*
Hab. : Burleigh Head, *H. Schneider.*

ENTODON, C.M.

E. latifolius, *Broth.* (n. sp.)
Hab. : Gladfield, *C. J. Gwyther.*

FABRONIA, Raddi.

F. Scottiæ, *C. M.*, **var. denticulata,** *C. M.*
Hab. : Gladfield, *C. J. Gwyther.*

RHAPHIDOSTEGIUM.

R. aciculare, *C. M.*
Hab. : Gladfield, *C. J Gwyther.*

AMBLYSTEGIUM, Schimper.

Small or tallish, creeping, prostrate, or ascending monœcious or diœcious mosses, the stems pinnately branched; leaves equal, shining, or obscure; cells with elongate areoles; thecæ cylindric inclined, arcuate; internal processes of peristome compact; cilia perfect or deficient; peduncle long; operculum very short.

A. leptopterygioides, *C. M.* (n. sp.)
Hab. : Gladfield, *C. J. Gwyther.*

POLYTRICHUM, Dill.

Erect, tufted, often large, rigid, dark-green or brown, monœcious or diœcious mosses, growing on the ground or roots of trees, &c. Stems very rarely branched, leaves usually long, thick, coriaceous, opaque; nerve very thick, with parallel grooves or plates on the upper surface; cells obscure, very minute. Fruit stalk terminal, stout. Capsule erect or slightly inclined, terete or 4 to 6-angled, rarely concaved or flat on one side and convex on the other, often contracted below the mouth; annulus none; teeth 16 to 32 or 64, very short; rigid or horny in texture, incurved, of several layers of superposed cells, with a circular membrane stretched loosely across their tips. Operculum flattish; often beaked. Calyptra small, cucullate naked or densely clothed with a thatch of matted hairs.—*Hook*, in N. Z. Flora.

P. Cameræ, *C. M.*
Hab. : Eudlo, *Field Naturalists.*

Order HEPATICÆ.

EULEJEUNEA.

E. flava, *Sw.*
Hab.: Gladfield, *C. J. Gwyther.*

FRULLANIA, Raddi.

F. squarrosula, *Tayl.*, **var.**
Hab.: Yandina, *Field Naturalists.*

MARCHANTIA, Linn.

M. pallida, *Steph.*
Hab.: Gladfield, *C. J. Gwyther.*

ANTHOCEROS, Micheli.

A. Brotheri, *Steph.* (n. sp.)
Hab.: Gladfield, *C. J. Gwyther.*

Order CHARACEÆ.

NITELLA, Agardh.

N. partita, *Nordst.*, Austr. Char. Part 1 Plate 1. Plant probably more than 1 dc. high, stem 0·6 mm. thick. Leaves about 6 in a whorl, about 10 mm. long, 300 μ thick at the base, 4 times divided. Segments at the first forking 4-6, at the second 3-5, of which 2-4 are again divided; ultimate segments, 150-180 μ thick; ultimate cell, 100-150 μ long, 40-52 μ thick at the base, bi-tripartite with cuspidate diverging points, like a Neptune's trident. Oogonia solitary, or rarely 2 together, the upper parts of the enveloping cells elongating, with spaces between them for fertilisation. Coronula short. Of this new and very interesting species only one small specimen with unripe fruit has been seen by me. At first sight it looks like *N. tricuspis*, but on a closer examination the forked apices of the leaf are seen to consist of only one bi-tripartite cell, and not, as in *N. tricuspis*, of 2-3 1-3-celled segments. Such a forked terminal cell does not occur in any other known species of *Nitella.*—*Otto Nordstedt, l.c.*

Hab.: Georgina River, *A. Henry* (comm. Baron v. Mueller.)

N. Hookeri, *Al. Br.* Monœcious. Whorls lax, lower remote, upper forming lax comose heads, of 6 or 8 rays; rays 2, 3-forked to or below the middle, one of them usually further divided; ultimate articulations of about 3 joints, the first elongated, the rest shorter, forming a 2-celled mucronate apex. Nucules usually in pairs; crown short, obtuse.—*N. Z. Flora.*

Hab.: Gladfield, *C. J. Gwyther.*

N. gelatinosa, *Al. Br.*, **var. podystachya,** *Al. Br.*
Hab.: Burpengary, *Dr. Thos. L. Bancroft.*

CHARA, Linn.

C. fragilis, *Desv.*, **f. microptila.**
Hab.: Gladfield, *C. J. Gwyther.*

C. australis, *R. Br.*, **var. lucida,** *Al. Br.*
Hab.: Stillwater, Gulf country, *Dr. Thos. L. Bancroft.*

LICHENES.

The following descriptions have been supplied by Mr. Shirley. Several of the species are new to science, and the remainder have not yet been described in any work on the botany of Queensland:—

LEPTOGIUM, Ach.

L. phyllocarpum, var. dædalum, *Nyl.* Thallus sordidly plumbeo-virescent or plumbeo-fuscescent, moderately firm; here and there longitudinally and closely undulate-rugose, but for the greater part irregularly and very crowdedly crispatulo-corrugate; apothecia obscurely rufous, often large, about 5 mm. wide. Thalline margin thickly crispate, or as if microphylline-luxuriant; spores ·026-·036 x ·013-·017 mm.—Nyl. i, 130.

Hab.: Common near Brisbane.

CALICIUM, Ach.

C. glebosum, *J. M.* Thallus obscurely whitish (or greenish); formed from more or less crowded, thickish, angulose glebulæ; podetia ½ mm. (or longer), stout, black-brown, nude; apothecia from obovoid usually broadly lentiform, outwardly and at the margin nigrescent-fuscous, not at all pruinose; disk at first aeruginose or subcinereo-pruinose, at length blackish; spores 8, at first in linear asci, when evolute free, ·008-·009 x ·005-·006 mm., the centre slightly constricted, brown.—Lich. Beit., No. 1133, J.M.

Hab.: Gladfield, near Warwick, *C. J. Gwyther.*

STEREOCAULON, Schreb.

S. ramulosum, var. microcarpoides, *J.M.* Plant 4-7 cm. high, beneath stout, in other parts finely branched and twigged, but almost destitute of papilliform branchlets; primary branches compressed below; apothecia small ·7-1 mm.; spores as in the type.

Hab.: Queensland; actual locality unknown, *Lich. Beit.*, 1495.

THAMNOLIA, Ach.

Thallus consisting of stipites or podetia which are cylindrical or subcompressed, cornute, imperforate, simple or branched, apices acute, internally fistulose. Apothecia unknown. Spermatia cylindrical.

T. vermicularis, *Sw.* Thallus chalky white 2-4 inches, prostrate, ascending or erect, subulate or turgid, simple or bifurcate, smooth or longitudinally rugulose, dispersed or caespitose.

Hab.: Gladfield, near Warwick, *C. J. Gwyther.*

STICTA, Ach.

S. pulmonacea, var. hypomela, *Del.* Differs from the type in having the reticulations which bound the depressions on the underside of the frond marked out with black (not ochraceo-testaccous) rhizinæ; apothecia as in *S. retigera*, with thalline margin rugose-crenulate, but marginal, while in the allied species they are scattered.—Nyl. i., 352.

Hab.: Mount Mistake, *Field Naturalists.*

S. filix, var. myrioloba, *J.M.* Whole plant distinctly more slender, along the margins almost everywhere adorned with small coralline-linear or almost opuntioid lobules; fronds stipitate, beneath towards the base strongly and prominently costate, and with the gonidia, habit, colour, and cyphellæ of the species.

Hab.: Toowoomba, by *C. H. Hartmann*; Lich. Beit., 1008.

THELOSCHISTES, Norm.

T. chrysophthalmus, v. alatus, *Shirley*, **var. nov.** Among specimens lately received from Mr. C. J. Gwyther there were seen growing in one tuft the normal orange-yellow form of the species, shading through *v. Sieberianus* and *v. leucoblepharus* to the glaucous *v. alatus* with broad and flattened fronds.

Hab.: Gladfield, near Warwick, *C. J. Gwyther.*

PARMELIA, Ach.

P. laceratula, var. minor, *Shirley*, **var. nov.** Thallus 1-2 in. in diameter, stellate, above glaucous, faintly impressed, marked with delicate rimæ, fracture white, lobate, imbricate; margins slightly upturned, crenate or crenate-dentate or isidiose-dentate, beneath white or pallid, nude or with few short concolorous rhizinæ; apothecia subpodicellate, margins thin, inflexed, disk rufo-testaceous or pale rufo-fuscous; spores 8, colourless, immature ?, ·007-·01 x ·003-·004 mm.; paraphyses very slender.

Hab.: Gladfield, near Warwick, *C. J. Gwyther.*

P. urceolata, var. subcetrata, *J. M.* This plant resembles *P. perforata v. cetrata Nyl.*, but the margins beneath are white, the laciniæ very narrow, with apices and lacinulæ subdigitate-divided, and the terminal divisions are usually furnished with globose white soredia. Apothecia unknown.

Hab: Toowoomba, *C. H. Hartmann*; Lich. Beit., 569.

P. urceolata, var. sorediifera, *J.M.* Thalline margins ascending, strongly undulate-crispate, incrassate, capitato-sorediiferous, and often confluently limbato-sorediiferous, when it is usually sterile; lobes beneath, toward the margins, sparingly ciligerous, usually in all parts white.

Hab.: Toowoomba, *C. H. Hartmann*; Lich. Beit., 569.

P. eciliata, *Nyl.* Thallus resembling a small form of *P. perlata*, whitish, lobate, beneath black, glabrous, rugulose, marginal lobes eroso-crenate. Apothecia sub-podicellate, elato-urceolate, apex commonly eciliate, back of receptacle at length rugose, when evolute 10-13 mm. wide; spores ·02 x ·012 mm.

Hab.: Toowoomba, *C. H. Hartmann.*

LECANORA, Nyl.

L. rhodophthalma, *J.M.* Thallus thinly tartareous, obsoletely rugulose, white, surface smooth, here and there with argillaceous carneous polymorphous cephalodia, 1-4 mm. wide; apothecia sessile, 1-2 mm., gyalectoid; margin thick, obtuse, white or subcarneous, persistent; disk carnose, lamina roseate, elsewhere hyaline; paraphyses capillary; spores 8, simple, hyaline or pinkish, ·014-9 x ·008-12 mm.

Hab.: Rosewood Scrub, on bark.

PERTUSARIA, DC.

P. leioplaca, var. gibbosa, *J.M.* Thallus and verrucæ cinereo-albid, in one part prominently rugose-gibbose, in another at first plurigibbose-unequal, when evolute plicatulo-unequal, or in part smooth; spores 8, or in some asci fewer.—Lich. Cost. Ric., 81.

Hab.: Goodna, *J. F. Shirley.*

P. leioplaca, var. octospora, *Nyl.* Thallus opaque, ashy-grey or whitish, minutely rugose; verrucæ crowded, flattened, to 2. mm. wide, rounded or difformate in outline; spores 8.

Hab.: North Pine, *J. F. Shirley.*

PSORA, J.M.

P. parvifolia, var. fibrillifera, *Nyl.* Thallus pallid cinereo-glaucescent, squamulæ lobulate-incised or crenate, or fibrillose-isidiomorphous, with somewhat terete nude fibrils, usually ascending or sub-erect; apothecia pallid-rufous or testaceo-rufous, to 1 mm., plane or rather convex; margin obtuse or not distinct; spores 8, ·008-·011 x ·0025-·0035 mm.—*Nyl.* Lich. Nov. Cal., p. 42.

Hab.: Toowoomba, *C. H. Hartmann.*

PATELLARIA, J.M.

P. (Bilimbia) sphæroides, *Dicks.* Thallus of minute, heaped, more or less at length, confluent granules, greenish-glaucescent and cinerascent; apothecia small, turgid, subglobose, at length clustered and confluent, pale carneous to tawny, rarely rufescent, the thin margin early excluded; spores ellipsoid to fusiform, 4-locular, ·014-·024 x ·004-·007 mm.

Hab.: 3-Mile Scrub, *J. F. Shirley.*

P. (Scoliosporium) multiseptata, *Shirley* (sp. nov.) Thallus cinereous, opaque, rugose, diffract; apothecia cinereo-suffused or naked, from sordid carneous to fusco-atrous, when young plane and with thick thalline clothed margin, the margin faintly crenulate and roughened, when mature plano-convex, and with margin obscured, epithecium and lamina more or less reddish, hypothecium white; spores 8, narrow acicular-clavate, rounded at one end, and very acuminate at the other, the thickest part about the fifth segment, 12-21 septate, ·04-·05 x ·0025 mm.; paraphyses not readily separating.

Hab.: Gladfield, near Warwick, *C. J. Gwyther,*

P. (Bombyliospora) Taitensis, var. epiglauca, *Nyl.* Thallus and disks of apothecia glauco-cinereo-suffused.

Hab.: Mount Mistake, *J. F. Shirley.*

BUELLIA, Körb.

B. tetrapla, var. nigro-cincta, *J.M.* Differs from the type in the thallus being girded by a narrow black zone.

Hab.: Bellenden-Ker, on bark.

HETEROTHECIUM, J.M.

H. vulpinum, var. glaucescens, *Nyl.* Thallus glaucescent throughout, thin, rather shining. Apothecia and spores as in the typical form.—Lich. Nov. Cal., p. 51.

Hab.: Goodna, *J. F. Shirley.*

H. biferum *(Nyl.) J.M.* Thallus thin glaucescent or glauco-virescent, or indicated by glauco-flavid spots; apothecia testaceo-fulvous in margin, with rufo-fuscescent epithecium, and within colourless, 1-2 mm. wide; thecæ bisporous, spores colourless, ellipsoid, transversely 9-13 septate, the septa as if spirally arranged, muraliloculose, ·027-·056 x ·012-·021 mm.—Lich. Nov. Cal., p. 49.

Hab.: Brookfield, *Field Naturalists.*

GRAPHINA, J.M.

G. (Aulacographina) tenuirima, *Shirley* (sp. nov.) Thallus albido-cinereous, surface even but not smooth, opaque; lirellæ numerous, crowded, straight or curved or flexuous, simple or pauciramose, 1-2 mm. long, sulcate; lips gaping; thalline clothed; terminations acute; disk narrow, nude, black; spores 5-septate, each loculus with 1-3 locelli, ·027 x ·01 mm., ovate-oblong or pupa-shaped; paraphyes conglutinate.

Hab: Gladfield, near Warwick, *C. J. Gwyther.*

TRYPETHELIUM, Trev.

T. anomalum, *Ach.* Thallus lutescent-brunneous; verrucæ subprominent, plane, tuberculose, difform, confluent, nigro-fuscous; apothecia within sordid cinereo-fuscescent; spores 16-18 locular, ·085-·11 x ·015-·018 mm.—Syn. T. platystomum, *Mont.*

Hab.: Coorparoo, on bark, *J. F. Shirley.*

Note.—Separated by *Mull. Arg.* from Melanotheca Achariana to which it had been joined as a synonym by *Fee.*

Order FUNGI.

Tribe AGARICINI.

AGARICUS, Linn.

A. (Lepiota) membranaceus, *Cke. and Mass.* (n. sp)

Hab.: On wood, Brisbane River, *Field Naturalists.*

The author's diagnosis is not yet to hand.

HIATULA, Fries.

(Diminutive of hiatus—a cleft. From the splitting pileus.)

Pileus very thin, without distinct pedicle, formed from the union of the back of the gills, splitting when expanded, as in very thin species of *Coprinus*, but not deliquescent, and spores white.—*Cke. Agaricini.*

H. Wynniæ, *Berk. and Broome*, Ann. Nat. Hist. No. 1772, Cooke's Illus. t. 688. (After Mrs. Lloyd Wynne.) Green-light Fungus. Plant white, pileus tender, striate, pulverulent, darker in the centre, about 1½ in. across; stem slender, striate, about 1 in. high and 1 line thick. Gills rather broad, rough, free from the stem.—*Cooke, l. c.*

Hab.: This beautiful fungus was met with a few months ago growing on decayed wood in Dr. P. Smith's bush-house, Dunwich. It is very luminous, emitting a greenish light.

HYGROPHORUS, Fries.

H. (Hygrocybe) sciophanus, *Fries*, Hym. Eur. 417. (Name from the Greek, appearing like a shadow. Delicate in comparison with *H. pratensis*.) Plant somewhat testaceous; pileus 1½ to nearly 2 in. across, of a rich dark-red colour, rather fleshy, convex, then depressed, obtuse, slightly viscid, opaque, margins striate, wavy, stem hollow, equal, subflexuous, even. Gills light red, decurrent, distant, connected by veins. Spores very pale, clay-coloured.—Cooke's Agaricini and Illus. t. 937, A. in part.

Hab.: On wood, Stradbroke Island. This species is met with in mossy places in Britain.

H. (Hygrocybe) conicus, *Scop.* Carn. II. 443. (Cap conical.) Plant fragile, rarely red, commonly yellow, viscid when moist, shining when dry, usually turning black; pileus about 1½ in. across, submembranaceous, conical, acute, smooth, somewhat lobed, at length expanded, and rimose; stem hollow, cylindrical, fibroso-striate; gills attenuated, free, ventricose, thin, rather crowded. Spores 10 x 7 μ.—Cooke's Agaricini and Illus. t. 908.

Hab.: On sandy land, Peel Island, Moreton Bay. Said to be common on pastures in Britain.

The Australian plants have a deep-orange pileus and canary-coloured gills; the stems are often deeply buried in the sand.

Tribe THELEPHOREI.

CYPHELLA, Fries.

C. longipes, *Cke. and Mass.* (n. sp.) Tobacco-pipe Fungus.

Hab.: On logs and stems of tree, Brisbane River scrubs, *Field Naturalists.*

A lovely white membranous species, of which the author's diagnosis is not yet to hand.

Tribe LYCOPERDACEI.

POLYSACCUM, DC.

G. album, *Cke. and Mass.* Grev. xx. 36; *Cke.* Austr. Fung. 245. Peridium globose (5-6 c.m. diam.) white, polished and shining, attenuated below into a very short, stout, irregular stem-like base; peridiola irregularly polyhedral (2-3 mm. across); spores in the mass yellowish-olive, globose rather coarsely warted 9-10 μ diam.

Hab.: Found on the ground at Eulo Dundoo, by Miss Zina Hammond, who sent it to the Victorian Mycologist, Mrs. Wm. Martin, by whom it was forwarded to Dr. Cooke.

Tribe SPÆRONEMEI.

GLŒOSPORIUM, Mont.

G. Lindemuthianum, *Sacc.*, Fungi Ital. 1032; Grev. xi. 15. Spots roundish, brownish, at first with a rufous border; pustules dirty white in the middle of the spots, inflated, then erumpent; sporophores fasciculate, cylindrical, simple, conidia terminal, oblong, straight or curved, ends rounded (·016-·019 x ·0045-·0055 mm.), granular within, hyaline.

Hab: In several parts of Queensland this blight has been met with on pods of French beans.

Tribe DEMATIEI.

MACROSPORIUM, Fries.

M. tomato, *Cooke* in Rav. Amer. Fungi No. 603; Grev. xii., 32. Tomato blight. Patches orbicular, black. Hyphis very short, robust, flexuose, septate. Spores clavate, gently attenuated from the top, but scarcely stipitate. Cellular tissue, dark-brown (·1-·12 x ·02-·022 mm.).

Hab: This fungus has been found to injure the tomato fruit in the gardens around Brisbane. It was first noticed upon fruit of the same kind in South Carolina.

Tribe PERISPORIEÆ.

ASTEROMELLA, Pass and Thüm.

A. homalanthi, *Cke. and Mass.* Spots sub-orbicular, on both surfaces, fuliginous (1 c.m. diam.); dotted with the minute black punctiform superficial perithecia. Sporules elliptic, hyaline 5 x 3 μ).

Hab.: Eudlo Creek, on leaves of *Homalanthus populifolius*, *Field Naturalists.*

HAMASPORA.

H. longissima, *R.*

Hab.: On foliage of *Rubus moluccanus*, Eudlo, *Field Naturalists.*

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L.4. Db94

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BULLETIN No. 20.

JANUARY, 1893.

BOTANY BULLETIN No. VI.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

e Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

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PREFATORY NOTICE.

THE subject matter of the present Bulletin differs from previous ones, in that it deals only with those plants commonly known as Freshwater Algæ.

These forms of our Queensland vegetation have not received that close attention which has been bestowed by collectors upon most other indigenous plants. Nothing will more strongly point out the neglect which these plants have suffered than to state the fact that more kinds are described in the present publication than were previously known to inhabit our waters. Their salt-water allies, probably owing to the bright colours of many, have received a fair share of attention. Being anxious to remedy this apparent slight to some of the most exquisite forms of vegetable life, about a year ago I induced my friend Dr. Thos. L. Bancroft, to collect as many kinds as possible during a brief holiday at Burpengary. He took up the work of collecting with his usual zeal. These specimens I forwarded to my correspondent, Professor Askenasy, of Heidelberg, who handed them for determination to his friend, Professor Martin Moebius, of Heidelberg, a specialist upon this particular order of plants; and his paper upon the first lot examined furnishes the groundwork for the present Bulletin.

Finding that the plants to be recorded as additions to the Queensland Flora represented many families and a large genera, I thought the opportunity should not be lost of making this pamphlet, as far as possible, an introduction to the study of these plants. I have, therefore, drawn largely upon Dr. M. C. Cooke's works, "British Freshwater Algæ and Desmids," for an account of the life history and characteristics of these plants. With regard to the classification, it was necessary that some system should be adopted, and I thought it best to follow that used by Professor Moebius in the paper to hand on the Queensland species. His descriptions of the new species and varieties, as well as his remarks upon others, are all reproduced, being translated from the German of his pamphlet by my friend Mr. W. J. Byram.

It will be easily imagined that something more than a verbal description of the plants should be furnished, so as to present them to most persons who are likely to consult these Bulletins; therefore, diagrams of a large proportion of the kinds are given, all copied from works of good authority—mostly from those by Dr. Cooke.

The extended account given of the various modes of reproduction and life history of the plants composing the several families brought under notice is furnished in the hope that this small pamphlet may be found useful as an introduction to the study of freshwater algæ in general.

It must be borne in mind that at the present the microscope is not the rarity it was fifty years ago; now but few gentlemen are without them, and to such this present publication will, doubtless, be most acceptable. It may be the means of stimulating their desire

for a still further knowledge of the wonders to be found in the still, shallow waters about their homes. And our knowiedge of these forms of vegetation will so increase that probably we shall soon be as conversant with our freshwater algæ as at present we are with our flowering plants.

Some may ask—In what situation or locality would it be best to search for these plants? And to answer this question I cannot do better than to quote Dr. Cooke, who says: "Generally, any slow stream, pond, or standing pool will furnish something. Rapid currents will not repay the search. Small pools on moors, amongst *Sphagnum*, will usually prove prolific; and submerged plants, especially when dead or dying, often serve as a habitat of attached species. Damp rocks, &c., &c., down which the water trickles, have their peculiar forms." This advice holds good in Queensland, except that rapid streams are productive of some most lovely forms; thus these should not be neglected.

As the subject treated of necessitates the using of some technical terms which may not be familiar to all, it has been deemed advisable to add a short glossary of terms more particularly met with in descriptions of cryptogamic plants.

BOTANY:
CONTRIBUTIONS TO QUEENSLAND FLORA.

QUEENSLAND FRESHWATER ALGÆ.

Class I. **FLORIDEÆ**, Ag.

FAMILY BATRACHOSPERMACEÆ.

Diœcious algæ. Thallus filamentous, articulate, branched, violet, or violet-purple or bluish-green, covered with mucous; primary filament and branches composed of a single central series of cells, and numerous external parallel continuous or interrupted secondary series, either furnished with globosely or sub-globosely densely conglobate tufts of equally distant verticillate fascicles of branches, or everywhere densely covered with simple or forked branches. Vegetation terminal. —Cooke's British Freshwater Algæ, 286.

BATRACHOSPERMUM, Roth.

Thallus moniliform, composed of a simple series of medullary cells and a cortical accessory parallel series, clothed with sub-globosely clustered fascicles of branches, which latter are sometimes more or less dispersed.—Cooke's British Freshwater Algæ, 286.

The following note is also from Dr. Cooke's excellent work, l. c.: —"Professor Horatio Wood has abstracted so well what is known of the reproductive process in the *Batrachosperms* that we cannot do better than quote his observations in full: 'Frequently in well-advanced *Batrachosperms* there will be seen scattered among the glomerules large, round, firm, dense balls, composed of a great number of small closely attached cells. These are the reproductive bodies. According to Graf zu Solms Laubach (*Botanische Zeitung*, 1867, p. 161), they are the result of sexual reproduction, and are developed from "antheridia" and "trichogonia" (female organs) in the following manner:—The antheridia are small roundish cells full of a colourless protoplasm, which is remarkable for the very numerous bright granules which it contains. They occur either scattered or in groups, and are placed upon the upper ends of peculiar ovate cells, also filled with a colourless protoplasm. Most frequently there is a single antheridium to the basal cell, sometimes two; the latter number appears never to be exceeded. When matured the antheridia open and allow their contents to escape in the form of roundish or flattened bodies, which never, as far as known, acquire cilia, and have, therefore, no power of spontaneous motion. These bodies, which are believed to be spermatozoids, are unprovided with anything like an external membrane, and are composed of protoplasm identical with that in the antheridium. While these changes are occurring certain cells in other localities are being transformed into female organs, to which the name of "trichogonia" is applied. These are borne upon cells similar to those supporting the antheridia. At first they are not markedly different from the

other cells, but soon undergo a very rapid growth. This is not, however, regular, and it is not partaken of by a band of tissue about one-third way from the basal end, so that at last a long, somewhat flask-shaped cell is produced, with a very marked contraction at the point indicated, separating it into two portions. The wall of this cell is thin, but very distinct, and the cavity is filled with a homogeneous or very sparsely granular protoplasm, which is continuous through the narrow neck-like portion. After a time there appear one or more large irregular vacuoles, with actively moving corpuscles in them, and at the same time the neck appears to be stopped with a slimy substance. Careful examination with reagents shows that this is a cellulose, and that it does not completely block the passage-way through the isthmus. At this time there appear lying upon the free end of the trichogonia globular or flattened bodies, without external membrane, corresponding in all respects with those already described as being produced in the antheridia. The end of the trichogonium generally enlarges at this period into a sort of roundish knob, and by-and-by the end wall between this and one of these globules becomes absorbed, so that there is a free communication between the two. Whilst this is going on the globule acquires a thin delicate coat, and there appears in it a vacuole similar to those pre-existing in the trichogonium. The first result of this impregnation of the trichogonium is the deposit of new cellulose, and the complete blocking up of the passage-way through the isthmus or narrowed portion. Already, before the fecundation, the upper cells of the branches supporting the trichogonia have produced numerous branchlets, which, growing upwards, more or less completely cover that organ. After impregnation the cells near to the trichogonium become much larger and broader, their vacuoles disappear, and are replaced by a dense granular dark greenish-brown protoplasm.

"'These cells now show a great activity in the production of numerous branches in the usual way; but it is the upper two alone which, with the trichogonium that they support, are concerned in the formation of the fruit glomerules. These put out all over their surface an immense number of protrusions, which soon, in the ordinary way, become the parents of as many twigs or branchlets, which, growing and branching precisely as do the vegetative branches, soon become excessively crowded. The base of the trichogonium participates also in the production of branches, and at last a dense ball is formed of pseudo-parenchymatous tissue by the forced adhesion of the crowded twigs. The central cells of the glomerule thus formed are very large and bladder-like. The outer part of the ball is composed of innumerable radiating rows of small cells, the end cell of each branch being roundish, so as to present a convex external face.

"'At maturity these cells open and allow their contents to escape as round masses, which appear to have no membrane, but begin at once to grow and secrete cellulose. Their after history has not been made out with absolute certainty, but they are believed to directly develop the new plant.'—Wood's Freshwater Algæ of U.S., p. 218."

Dr. Cooke points out that it is somewhat uncertain what should constitute the limits of species in this genus, and considers that there is no more decided specific characters to separate *B. vagum* from *B. moniliforme* than can be found between so-called varieties of these species.

BATRACHOSPERMUM, Roth.

B. vagum (*Roth.*), Ag. Syst. 52. Cooke's British Freshwater Algæ, 291. Vaguely branched, 1 to 3 in. long, brownish or bluish-green; inferior internodes covered with a dense mass of branchlets; the superior naked, or nearly so, apical joints of the branchlets attenuated into a long bristle. Size: Cellules, ·025 x ·012 mm.—Cooke, l.c.

In no other *Conferva* is the number of the filaments so considerable as this. Their total diameter equals that of the largest horsehair. They divide in every direction from a little disc, ramify to infinity, observing remarkably well the dichotomous disposition in their first division, their branches becoming subsequently vague. Their total length extends even to 4 in. From their origin even to their extremity these filaments are clothed with microscopic branches, so impacted that the whorls are not apparent in scarcely any direction; with a simple lens they are not better discovered, from which it might be supposed that one was observing a *Thorea*. It is but towards the points of the branches that, by the assistance of a strong lens, they are at last distinguished. These whorls are very closely approximated, horizontal, compressed the one upon the other, and becoming so confused as to form around the filament, which is green or yellow, and very flexible, a continuous down, mucous to the touch, sometimes very pale, more frequently of a very agreeable bluish watery green; this colour is, moreover, deep towards the point of the branches. As it grows old the plant turns yellow, and is discoloured.—*Borg.;* Cooke, l.c.

B. vagum. c. flagelliforme, *Sirdt.* Professor Moebius, referring to this species, says:—"It grows upon twigs in deep water, has a bluish-green colour, and forms tufts as much as 7 cm. long. From the lower portion proceed several thicker branches, whose side branchlets stand tolerably far apart, are long, and slightly branched laterally. On the main branches the joints are about 1·5 mm. long, and the whorls have a diameter from about 0·5 mm. The interverticillate branches are very numerous, and as long as those in the whorls, so that here the latter are not seen so conspicuously. The cells of the whorl-branches are considerably elongated, 6-7 μ in thickness, and 5-6 times as long. On account of the prolonged cylindrical form of these cells, I have also set this alga down as the form *flagelliforme*. Moreover, this is that form which, according to the general rule, develops normal spore-clusters (sporenhaufen), while the others are for the most part sterile; indeed, only the form *affine* produces, according to Sirodot, large spore-clusters projecting, however, from the whorls, which is not the case here. The female organs are developed in *B. vagum* only on the nodes; and in point of fact the trichogonia spring from the basal cell of a tuft of branches. I frequently found the early fructification, which showed the large club-shaped trichogonia, considerably diminished below, surrounded at the base by bracts and fertilised by a spermary. Mature spore-clusters were not correspondingly abundant; they stand out with particular distinctness when the whorls and interverticillate branches are to some degree developed. The antheridia occupy the ends of all the branches, including those of the whorls on which fructification is formed. According to the general rule, the latter ought not to be the case. The hairs are very abundant, and the projecting ones are as much as 160 μ long. Moreover, particular mention is due to the false branches, which originate in

such a manner that on the nodes, and more rarely on the internodes, the cortical threads grow outwards and lie upon each other in a bundle of two, three, or more. The threads also often twine together in an extended spiral, while they retire from each other again at the end. From them arise, particularly at the ends, threads of cells analogous to those of the whorl-branches, and generally bearing antheridia (Fig. I). I frequently found this formation on such branches, while the normal whorl and interverticillate branches had, for the most part, lost it. Sirodot mentions false branches of the same kind, in particularly large forms of *B. helminthosum*, but not in *B. vagum*; he does not, however, give a representation of their appearance. Somewhat different are the so-called 'prolifications,' these being real branches, which, however, on the cortical threads or on the whorl-branches, originate at a distance from the axis, and are to be met with in *B. densum*, *Decaisneanum*, *pyramidale*, *pygmæum*, and *Dillenii*. *B. vagum* is, according to Sonder, known in Australia (Launceston), and likewise occurs in Europe and North and South America."

Hab: Burpengary (Deception Bay), in stagnant water, *T. L. Bancroft.*

B. (species). Professor Moebius had not before him sufficient material to determine this species; but his remarks are appended, as they may facilitate further research. He says:—"Of this form defective specimens only were present, as neither entire plants nor those with female organs were to be met with, for which reason the species cannot be determined. The branches have a rather variable appearance, for in some places the whorls are clearly defined, in others indistinct, owing to the existence of large numbers of interstitial branchlets of considerable length, and likewise often grouped into whorls; between the extreme forms, however, transitional states occur. On the older branches the joints are about 1 mm. long. This *Batrachospermum* differs from the foregoing in the form of the cells in the whorl-branches, since this, for the most part, varies from spherical to ovate, and is more rarely cylindrical. Hairs are also here present. The whorl and interverticillate branchlets are plentifully beset with antheridia. It seems, therefore, to be a diœcious species."

Hab: From the swamp water at pumping station, Stradbroke Island, *Thos. L. Bancroft.*

CHANTRANSIA, Fries.

Forming dwarf pulvinate tufts, of a purplish-violet or steel-blue colour. Thallus filamentous. Threads articulate, formed of a single series of cells, branched, straight, naked, fasciculately branched above, joints cylindrical. Propagation by immovable spores formed at the tips of the branchlets. Tetraspores rarely observed.

After describing the Batrachospermum, Prof. Moebius says:—"Upon the branches of the Batrachospermum just mentioned grew here and there threads of a *Chantransia*, nearly allied to *C. violacea*, Kuetz., which, moreover, is mostly found upon *Lemanea*. The cells were 7-11 μ broad, and from 3 to 9 times as long; hairs were absent. The spores were oval, about 10 : 14 μ in size. The basal portions of this *Chantransia* insinuate themselves between the branches of the Batrachospermum; but do not stand in a relation of organic adhesion to them."

Hab.: From the water at pumping station, Stradbroke Island, *Thos. L. Bancroft.*

C. violacea, *Kuetz.*, Cooke's British Freshwater Algæ, 283. Tufts bright violet, scarcely exceeding a line broad, pulvinately rounded, threads straight, branches becoming erect, radiately disposed; joints 3-6 times as long as broad, the apical joints rather obtuse. Size: Cells, ·008-·009 mm. diameter.—Cooke's British Freshwater Algæ, l.c.

This is given to aid in identifying the above plant when again met with:—

Fig. 2: *a*, tuft natural size; *b*, portions of filaments x 300 diam.—Cooke, l.c.

Class II. CHLOROPHYCEÆ (Kuetz.) Wittr.

Order I. CONFERVOIDEÆ (Ag.), Falk.

Family II. COLEOCHÆTACEÆ (Næg.), Pringsh.

COLEOCHÆTE, Bréb.

(So named from the bristles being sheathed.)

Articulated filaments branched, either united in a pulvinule or little cushion, or expanded in a flat, somewhat disc-shaped, parenchymatous thallus; cells oblong, more or less dilated in front, sometimes bearing from the back or upper surface a hyaline bristle, which is sheathed at the base. Propagation by oospores resulting from sexual fertilization, and by zoogonidia. Zoogonidia single in the fructiferous cells, either globose or broadly oval, furnished with two vibratile cilia.—Cooke's British Freshwater Algæ, 195.

The *Coleochæteæ* are small discoid algæ, from 1 to 2 mm. in diam., bright green colour, constructed of branched rows of cells. They are found attached to submerged plants in stagnant or slow-moving streams, and form circular, closely pressed discs. The chlorophyll is in parietal plates or large granules. Some of the cells bear colourless erect bristles fixed at the base in narrow sheaths. Reproduction takes place by means of asexual zoogonidia and sexually-produced oospores. The latter do not at once produce new plants, but several zoospores. The zoospores, which are developed in the early part of the year from resting-spores of the previous year, produce only asexual plants which only form zoogonidia. After a series of asexual generations of variable length, a sexual generation arises, which according to the species is monœcious or diœcious. Fertilization produces one oospore in the oogonium, which develops into a reproductive body, from the cells of which zoospores proceed in the next period of vegetation. Zoogonidia may originate in all the vegetative cells of the *Coleochæteæ* and are always formed from the entire contents of the mother-cell escaping through a round hole in the cell wall.

"In *C. pulvinata*, the terminal cell of a branch swells up, and at the same time elongates into a narrow sac, which then opens, and exudes a colourless mucilage. The protoplasm of the swollen part, which contains chlorophyll, forms the oospore, in which a nucleus is visible. The antheridia are formed at the same time in adjoining cells, two or three protuberances growing out, which become separated by septa; each of the cells thus formed, which have somewhat the shape of a flask, is an antheridium; its entire contents form an antherozoid of oval shape with 2 cilia, which is endowed with motion like a zoogonidium; its entrance into the oogonium has not yet been

observed. The effect of a fertilization is seen in that the contents of the carpogonium become surrounded with a proper membrane and form of oospore."—Cooke, l.c.

C. Baileyi, *Moebius* (n. sp.) This is a new species of *Coleochæte*, discovered by Prof. Moebius amongst the specimens sent to him, and named by him. He says:—"In discussing the algæ of this class, I follow the arrangement and nomenclature which De Toni has adopted in his excellent work '*Sylloge Algarum*'"; and then proceeds as follows:—"This alga forms little cushions of jelly about the size of a pin's head upon the submerged portions of plants. It consists of branched threads lying flat, which radiate widely from a middle point, and give off upright threads likewise branched, whereon the organs of reproduction are formed. The thallus is enclosed in a large jelly-mass, from which only the long ends of the hairs project. The branching is monopodial, yet very irregular; the branches are generally given off singly, more rarely opposite. The vegetative cells are 14-20 μ in thickness, and mostly longer than broad, $1\frac{1}{2}$-2 and more rarely 3-4 times longer than the diameter; such extended cells occur especially in the upright threads. The form of the cells varies from cylindrical to polygonal; in the former case they are often curved. Every cell contains a disc-shaped chromatophore, curved at the edges with a pyrenoid. Cells with two chromatophores exist, at any rate, on the point of undergoing subdivision into two supplementary cells. Hairs occur abundantly and appear singly upon cells favourable to them. They are single, tube-shaped prolongations of the supporting cells, from which they are not separated by a septum. They are, without taking the sheath into account, about 2 μ in thickness. These consist of an outer membrane, which has followed the growth of the hair only at an interval, when it has become very much thinned and finally torn. The sheath terminates again on the inside of the gelatinous envelope, and shows at the end a funnel-shaped extension; sometimes, also, several constrictions are to be observed upon the upper part of it. The points of the hairs are at a later period mostly truncated. Sporangia, antheridia, and oogonia occur in the same specimens, but those plants which produce sporangia abundantly, for the most part, form only to a small extent male and female organs.

"The swarmspores are formed both in the terminal cells of the upright branches and in the cells lying beneath them, so that a whole series of cells may be found to have poured out their contents as swarmspores. This emission is the consequence of the rupture of the cells at their upper ends (Fig. 3*b*). The antheridia are formed, as in *C. pulvinata*, as small flask-shaped papillæ on the upper portion of the vegetative cells—often as many as ten upon a cell; their size reaches about 7-12 μ. It seems that the contents of the supporting cells may be wholly used up in the formation of antheridia, for the cells which bear numerous empty antheridia are themselves, for the most part, empty, with the exception of a small plasmic mass (nucleus ?) (Fig. 3A). The emission of the antherozoids ensues upon the rupture of the membrane at its top.

"The oogonia appear to occur in the plants observed in an abnormal situation, for they are very slightly separated from the thallus, and their further development into fructification cannot take place *in situ*. They are mostly found in the neighbourhood of the branching, but

placed sideways and reclining. Generally, they appear only as large spherical cells, with numerous oil-globules, and with an investment which takes, in opposition to the investments of the other cells, an intense red stain, with congo-red. Sometimes it may be observed that the spherical cells are extended at one spot into a short thin neck (Fig. 3*a*, A, B), in addition to which below the neck a second smaller spherical protuberance was detected. The investment appears to be formed by two cells, which grasp the oogonium like a pair of forceps, resembling what takes place in *C. pulvinata;* but not so as to wholly surround them. The investment does not seem to go further, for already in this situation I saw the contents of the oogonium divided (Fig. 3c). The second division follows perpendicular to the first, so that in the oogonium four cells lie beside each other. Such conditions were, however, only very seldom observed; most frequently oogonia are not further developed, and sometimes are closely invested by the neighbouring branches. The development of the embryo takes place in the same manner as Pringsheim has menticned in the case of *C. soluta* and *C. pulvinata*. The swarmspores having become stationary undergo subdivision by a wall into two cells lying beside each other. One of these grows outwards to the left, the other to the right, so that the first branch cells stand obliquely opposite to each other. In this case also the last ones evidently extend in the first place parallel to both the original cells, then divide, and permit the germination of other cells. The whole development is best made out from Fig. 3D, which is singularly like Fig. 3 (Plate II.), in Pringsheim's treatise (Jahrbücher, vol. ii.), which represents a complete specimen of *C. pulvinata f. minor*."

Hab.: Burpengary, *T. L. Bancroft*.

This being a new species, Prof. Moebius gives the following Latin description, of which I append a translation:—"Thallus gelatinosus, subglobosus, e filis decumbentibus, radiantibus, quæ fila erecta et ipsa ramificata gignunt, constitutus est. Cellulæ vegetativæ 14-20 μ crassæ, diametro 1½-2 plo, varius 3-4 plo longiores, multæ setis longis instructæ sunt. Zoosporangia, antheridia, oogonia in eadem planta inveniuntur. Zoosporangia e cellulis supremis et superioribus filorum erectorum oriuntur. Antheridia parva, 7-12 μ longa, papillata, in superioribus cellulis usque ad dena insident. Oogonia lateralia, sessilia, magna, globosa, collo brevi instructa, post fecundationem duabus cellulis corticalibus forcipis modo cinguntur. (Earum evolutio haud satis nota est.) Germinatio eadem est ac *Coleochætes solutæ et pulvinatæ*."

The gelatinous subglobose thallus is composed of radiating threads lying flat, which give rise to erect and also branched threads. Vegetative cells 14-20 μ thick, one and a-half times to twice, rarely three or four times, longer than the diameter. Many are furnished with long bristles. Zoosporangia, antheridia, and oogonia are found in the same plant. Zoosporangia originate from the terminal and superior cells of the erect threads. The small papillate antheridia, 7-12 μ long, are situated upon the superior cells, even as many as ten upon each. The oogonia are lateral, sessile, large, globose, and furnished with a short neck; after fecundation they are surrounded by two enclosing cells, after the manner of a forceps (their development is not sufficiently known). Germination is the same as in *Coleochæte solutu* and *C. pulvinata*.

C. conchata, *Moebius* (n. sp.) Prof. Moebius describes this species as follows:—"This species is smaller than the foregoing, with which it is generally found in association, and forms flatter cushions of jelly. Since all the branches lie nearly in one plane, it recalls to mind a light-branched form of *C. soluta*, while in the branching and form of the cells it approximates more nearly to *C. pulvinata*. In the centre the branches are interlocked with each other almost in a pseudo-parenchyma; the outer branches, on the other hand, leave considerable spaces between them. It would be a matter of difficulty to find layers equally perfect on all sides; as a general rule, one side is more completely developed than the other, and no clear point of departure is to be seen. The cells are roundish, 10-14 μ broad, and 14-18 μ long; their contents are constituted as in the foregoing species. Hairs occur very abundantly, and attain a considerable length. In their structure they resemble those of the foregoing species; the sheath is, however, smooth up to its end, and in this case the edges are somewhat curved outwards (Fig. 4). Of reproductive organs only antheridia and oogonia were found in this species; sporangia were not present in the specimens examined. Moreover, both organs occurred in the same plant; this species is therefore, like the foregoing, monœcious. The small papillæ-shaped antheridia, which are 4·5 μ thick and 10 to 12 μ long, are mostly placed singly upon the upper and uppermost cells of the branches (Fig. 4A). The oogonia always seem to proceed from the terminal cells of the branches, and are so formed that their distal end grows outwards into a long neck, which swells at the end into a knob-shaped formation. The neck is about 3 μ in thickness and ten times as long. It opens at its end, which projects above the gelatinous envelope, in order to admit the antherozoids. After fertilization the oogonium increases considerably in size, and the oospore becomes invested with a very thick glistening membrane, whilst the thinner membrane of the oogonium assumes a yellowish colour. The investing layer is very peculiar. After the supporting cell has divided longitudinally, one-half becomes united to one of the investing cells; the other investing cell becomes separated sideways from the other half. Both the investing cells diverge from each other so widely that they touch each other with their edges, and encompass the oogonium like two mussel-shells. Only opposite the point of application, where in young fructification the trichogonia are yet to be observed, they perhaps do not grow completely round (Fig. 4A). From the edges in contact with each other very soon originate inwardly layers of membrane placed in the shape of rays, which attain a varying length, and are partly curved and forked at the end. The whole fructification has an almost lenticular shape. Seen from the flat sides it appears almost circular with a diameter of 70-80 μ; the folds of the membrane are then seen proceeding from the margin, where the membrane is tolerably thick, in the form of rays towards the middle (Fig. 4). Seen from the narrow sides the fruit appears elliptical; over the longitudinal diameter runs the line of contact of both the investing cells, from which layers of membrane alternately proceed. Concerning the further changes in the oospore and the germination, I have, I am sorry to say, been unable to ascertain anything."

This being a new species, Prof. Moebius adds the following description in Latin, of which I subjoin a translation:—"Thallus gelatinosus, compressus, filis radiantibus, medio fere in pseudo-parenchyma

aggregatis formatus est. Cellulæ vegetativæ rotundatæ, 10-14 μ crassæ, 14-18 μ longæ, multæ setis longis ornatæ sunt. Zoosporangia ignota sunt; antheridia et oogonia in eadem planta inveniuntur. Antheridia parva, 4-5 μ crassa, 10-12 μ longa papillata, plerumque singula in superioribus cellulis insident. Oogonia e cellulis extremis orta collo longo instructa, post fecundationem duabus cellulis testæ concharum modo plane circumdantur, utruisque cellulæ membrana a peripheria ubi cellulæ recontingunt, plicas centrum versus directas formante, characearum antheridii modo. Germinatio ignota est. Hab. una cum precedente."

The thallus is gelatinous and flattened, and is formed of radiating threads aggregated in the middle almost into pseudo-parenchyma. The vegetative cells are rounded, and are 10-12 μ thick and 14-18 μ long; many are furnished with long bristles. Zoosporangia are unknown; antheridia and oogonia are found in the same plant. The antheridia are small, 4-5 μ thick, 10-12 μ long and papillate, and one is generally situated in each of the superior cells. The oogonia originate from the terminal cells; they are furnished with a long neck, and after fecundation are distinctly surrounded by two cells, after the manner of the shell of a mussel; the membrane of each cell from the periphery where the cells come into contact forming folds directed towards the centre, after the manner of the antheridium of *Characeæ*. Germination is unknown.

C. orbicularis, *Pringsh.* Cooke's Freshwater Algæ, 197; Plate LXXX., Fig. 1. Disc orbicular, parenchymatous, formed from one stratum of cells; bright-green; cells oblong-quadrangular when old, by pressure becoming often polygonal, usually twice as long as broad. Oogonia oval, peripherical, mostly naked. Size: Cells, ·012-·017 mm.

Prof. Moebius says that in the collection sent to him he only noticed this species in disjointed incomplete specimens, partly with isolated cells, without reproductive organs, emptied probably by the formation of swarmspores, partly with ripe fructification.

Fig. 5: *a*, plant x 200; *b*, portion with oogonia x 250.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft.*

This plant is met with in many parts of Europe, North America, and New Zealand. Prof. Moebius adds Siberia and Hawaii.

C. scutata, *Bréb.* Cooke's British Freshwater Algæ, 196; Plate LXXIX. Filaments and their branches radiating from the centre, very densely connate in one stratum, forming a kind of parenchymatous orbicular disc; cells quadrangular, nearly equal or twice as long, oogonia subglobose, peripherical, corticate above, naked below. Size: Cells ·02-·022 mm.

Of this species Prof. Moebius remarks that he only observed a sterile specimen in the collection sent to him.

Fig. 6: *a*, plant x 200; *b*, portion with oogonia; *c*, portion with antheridia cells; *d*, zoospore active and at rest; *e*, development of young plant.

Hab.: Burpengary, *Thos. L. Bancroft.* Also in Europe, North and South America, Afghanistan, Brazil, and New Zealand.

CHÆTOPELTIS, Berth.

The thallus is disc-shaped or orbicular, and is of a lively green colour. It is adherent, occurs in water, is epiphytic, parenchymatous, and like *Coleochæte* in appearance; the contents of the cells consist

of granular protoplasm, in which is a single pyrenoid with clearly defined boundaries, enclosed by chlorophyllaceous matter evenly diffused. Cellular membrane somewhat thickened, slightly gelatinous (as in *Enteromorpha*), extending into long, slender, unjointed bristles of dense substance, slightly thickened at the base, and existing singly or in numbers; cells with single nucleus. Propagation by zoogonidia, which originate by successive divisions (2-4-8) of the cells. The zoogonidia are oblongo-ovate and of varying size, have each a pyrenoid in the centre, and are furnished with 4 long cilia and a red spot at the side. They are liberated by the parting of the membrane of the mother cell, and at the same time become enclosed in a thin vesicle, afterwards ruptured. The zoogonidia, after swimming freely for about half-an-hour, become stationary. They are then surrounded with a somewhat wrinkled investment, and affixed to a substratum by a hyaline portion. They afterwards spread out, and soon after germinate. Generation by zygotes resulting from the conjugation of biciliate zoogonidia, originating in one or two vegetative cells.

C. minor, *Moebius.* Prof. Moebius places a query against this plant in his list, and remarks:—"I saw several young plants, which in all respects resembled the early form of the known species observed by me; yet they might also belong to *Ch. orbicularis*, Berth. Both species differ from each other chiefly with regard to the swarmspores."

Hab.: Burpengary, *Thos. L. Bancroft.* Also found at Tahiti and Guadalupe.

Family III.—ŒDOGONIACEÆ (Wittr.), De Bary.

Monœcious or diœcious algæ. Filaments articulated, either simple (Œdogonium) or branched (Bulbochæte). Basal cell obovate-clavate, mostly lobately divided or ending in a disc. Propagation by zoospores, or by oospores after sexual fecundation. The zoospores formed singly in certain cells, broadly oval or globose, transparent at one end, and furnished with a crown of vibratile cilia. Oogonia single or in a chain (2 to 5), contiguous to each other, more or less tumid, with a single oospore in each, becoming reddish-brown or yellowish when mature, and then, before germination, dividing into (mostly 4) zoospores. Male plants, dwarf (nannandrous), and attached to the female plants, or elongated (macrandrous), and similar to the female filaments (often rather thinner). Spermatozoids produced in abbreviated special cells (spermogonia).

ŒDOGONIUM, Link.

Articulated filament simple, at first fixed, afterwards free, swimming. Cells marked with transverse striæ at one or other extremity. Terminal cell sometimes elongated and setiform. Either monœcious or diœcious; when diœcious the male plants either dwarf—produced from short cells of the female plants—or elongated and independent. Propagation by asexual zoospores, and by oospores sexually fertilized. —Cooke's British Freshwater Algæ, 148.

The sterile filaments of *Œdogonium* resemble those of *Conferva* at a casual glance, but are soon seen to be distinguished by transverse parallel striæ at one or other extremity of many of the cells. These striæ are indications of the mode of cell increase, which takes place in the following manner:—When a cell has reached maturity, and is about to divide, a little circular line is seen near its upper end.

Gradually the line widens, and it is seen that the wall of the mother cell has divided all round, and the cell above is slowly raised by the growth of the daughter cell, arising, as it were, out of the apex of its parent cell, and carrying upwards the first streak or cap left by the breaking away of the wall of the mother cell. In this manner the new cell soon attains a length equal to the one from whence it sprung. When the young cell has matured it becomes in turn a mother cell, the splitting round is repeated, a second streak or cap is carried upwards, and thus as many as four, five, or six successive cells are formed, as indicated by the four, five, or six striæ or caps which may be counted at the apex of a cell. The number of caps correspond to the number of cells produced in this manner consecutively immediately beneath the caps. Asexual reproduction takes place by the formation of a single zoospore in one of the cells of the filament. It is of a globose or somewhat ovate form, furnished near its apex with vibratile cilia. When mature it escapes by rupture or fissure of the mother cell, moves about for a while, then becomes attached by the ciliated end, and ultimately develops into a young plant.

Sexual reproduction is varied in three ways. In the monœcious species the oogonium is an inflated cell, more or less globose, enclosing a single oospore of similar form. The oogonium is either perforated by a pore, or splits round and opens with a lid or operculum. The same thread bears above or below the oogonium very much shortened cells, in which one or two active spermatozoids are produced. These escape when mature, and fecundate the oospore through the perforation or opening of the oogonium, after which they disappear, and the oospore ripens into a perfect, fertile, resting-spore.

In the diœcious species there are two modes of sexual reproduction. In one group of species the males are dwarf; almost might be called antheridia. The oogonia and oospores are the same as in the monœcious species. In like manner there are also abbreviated cells in some other part of the same thread, but these do not produce spermatozoids, but androspores—small, active, ciliated bodies—which move about for a time, and then attach themselves either upon or near the oogonia, grow into the form of an inverted flask, being supported by a more or less elongated stem, and constitute the dwarf male (nannandrous) plants, the cells at the apex of which contain the spermatozoids, the upper cell opening by a lid or cap to permit of the escape of its contents, which fertilize the oospore as in the previous method.

The second group of diœcious species have male filaments, which in all respects resemble the sterile females, except that they are usually a little thinner. The female filaments produce only the oogonia. The male filaments, in certain abbreviated cells, give origin to the spermatozoids, which in due time escape and fertilize the oospores of the female plants. **Thus, in the first group, the dwarf males are generated in** certain privileged cells of the female plants, whilst in the second group the male and female filaments are from the first distinct. The former are called nannandrous species; the latter macrandrous.

The fertilized oospore becomes a resting-spore, which ultimately passes through the following stages:—Previous to germination the spore has an egg-shaped figure; the cell-contents are densely crowded, and composed of minute brownish-green granules, closely surrounded by a distinct cell-membrane. Outside this membrane there is found besides quite a distinct cell-membrane. Upon germination there are

formed in both membranes slit-like openings, whereupon the cell-contents emerge, surrounded by an extremely delicate hyaline covering. The cell-contents are composed, not of one but usually of four green masses, each surrounded by its cell-membrane. Sometimes, also, as it appears abnormally, the masses are two or three in number. The four cells which proceed from germination possess an oval form, and their cell-membrane is hyaline. After the contents of the spore have emerged, there remains behind the outer membrane enclosing the inner one. After the four cells have remained some time enclosed in the hyaline covering, this becomes resorbed subsequently, and the four cells lie still and motionless; but after the course of a short time the cells burst on one end by means of an annular slit, and the apex, separated thereby from the remainder of the cell-membrane, becomes elevated like a lid. Through the circular opening the contents now emerge, which at the part turned towards the opening is colourless. This apex moves with vigorous motion backwards and forwards, and after an hour the cell contents, in the form of a zoospore, leave their place of detention, which we now find to be a doubly-coloured cell-membrane. The little zoospore wheels in a lively manner about with a circling movement, whereby the colourless point becomes directed downwards. Its appearance is like that of an ordinary zoospore, and, like it, possesses an oval form and a lighter apex, furnished with cilia, which during the motion is always directed forwards. After a time the movements become faint, and finally cease. The cilia disappear, and the light end becomes elongated into a root, which sometimes becomes an organ of attachment, quite like that produced in the germination of the zoospores. The rounded end of the germinating zoospore acquires a little point-like apex. This growth becomes divided by a transverse septum, and a little two-celled *Œdogonium* has originated. From each spore there are thus derived, in general, four plants.—Cooke, l.c.

Prof. Moebius says:—"This genus was abundantly represented in the collection; but comparatively only a few species could be determined, since many were sterile, and in other cases even where they were in fruit they were too incomplete to afford the necessary characteristics for their determination. I am much indebted to Dr. Nordstedt for having revised a portion of my preparations with respect to which my determination was uncertain, and for having communicated to me some new determinations, such as measures and other notes. I can consequently mention the following species with more or less certainty."

Œ. excisum, *Wittr. et Lund.* Cooke's British Freshwater Algæ, 157; Plate LIX., Fig. 4. Oogonia single, biconically-oblong, median processes 9; rounded, small, oogonia deeply cut round (circumscissile), vertical vein orbicular, margin slightly undulated; oospores ellipsoid, as if constricted in the middle, not filling the oogonium. Spermogonia 1-2 celled, subepigynous or hypogynous, terminal cell obtuse, upper part of the filament curved. Size: Cells, ·0035-·005 mm. by 5-6 times as long; oogonia, ·013-·015 x ·018-·025 mm.; oospore, ·099-·012 x ·015-·018 mm.; sperm-cell, ·003-·0035 x ·006-·007 mm.—Cooke, l.c.

Prof. Moebius gives the following note:—"Monœcious, easily capable of being recognised by the deep constrictions which run round the oogonium. It has a transverse diameter from about 18 μ, and

a somewhat greater length. The vegetative cells are only about 4 μ thick, and 5-6 times as long. These measurements agree with those hitherto specified."

Fig. 8: Showing oogonia; *a*, section of oospore x 400.—Cooke, l.c.

Hab.: Nines Waterhole, Myrtle, *Thos. L. Bancroft*. Also found in Europe and Senegal.

Œ. undulatum, (*Bréb.*) *A. Br.* Cooke's British Freshwater Algæ, 160; Plate LIX., Fig. 9. Oogonia single or twin, ellipsoid-globose, or nearly globose, opening by a pore below the middle; oospores ellipsoid-globose, or nearly globose, nearly filling the oogonia; vegetative cells four times undulatingly constricted; terminal cell (which sometimes is the oogonium) obtuse; dwarf males obconical, seated on the supporting cells. Size: Cells, ·015-·017 mm., 3-5 times as long; oogonia, ·051-·056 x ·057-·075 mm.; oospores, ·046-·05 x ·048-·06 mm.; dwarf males, ·009-·01 x 0.—Cooke, l.c.

Prof. Moebius' note is as follows:—"Of this species small sterile fragments, amongst the other algæ, were all that were found. Notwithstanding this, it cannot be mistaken for the vegetative cells (17 μ broad and 4-5 times as long) are regularly furnished with four clear constrictions, if looked at from the constrictions to the transverse walls. Only the walls of the basal cell are smooth; it has a somewhat extended foot, and swells out towards the top into the form of a club. In a 2-celled individual I observed that in the second cell only the inner membrane was undulating, whilst the outer formed a smooth cylinder (Fig. 9A). The organs of fructification of this species I do not know from my own observation. It is dicœcious, with dwarf males. The oogonia stand singly or in pairs, form an opening on the under half, and are almost filled with the oospores. The elongated, rounded, skittle-shaped dwarf males are placed upon the support cells."

Hab.: Burpengary, *Thos. L. Bancroft*. Met with throughout Europe.

Prof. Moebius says:—"Known throughout Europe and North America. Nordstedt has described a variation *senegalensis*. He also writes to me that he has seen a different form (*B. incisum*) from Australia."

Œ. cyathigerum, *Wittr.* Prof. Moebius remarks:—"This species agrees with the foregoing in the fact that the dwarf males are single-celled. They are seated in considerable numbers on the upper end of the supporting cell and are about 12 μ thick and 60 μ long. The oogonia are elliptical (almost oblong), 58 μ broad, almost 80 μ long; the oospores which fill the oogonium correspondingly smaller. The vegetative cells are very long (20-30 μ thick, 6-7 times as long); the supporting cell is thicker (45 μ).

Hab.: Burpengary, *Thos. L. Bancroft*. Also in Europe.

Prof. Moebius says:—"The typical form to which the Australian specimens might belong is known throughout Europe and North America."

Œ. flavescus (*Hass.*), *Wittr.* Cooke's British Freshwater Algæ, 160. Plate LX., Fig. 2. Idio-androsporous. Oogonia single, egg-shaped-globose (sometimes rather hexagonally globose), opening by a pore a little above the midddle; oospores globose, not filling the oogonia; androsporangia 1-9 celled; dwarf males a little curved, seated on the supporting cell; spermogonia 1 (or 2?) celled. Size: Cells, ·018-·021 mm. by 4½ to 6 times as long; oogonia, ·049-·052 x ·051-·060 mm.; oospore, ·045-·049 x ·045-·049 mm.; androsp. cell, ·017-·02 x ·008-·018 mm.; sperm. cells, ·009-·01 x ·015-·02 mm.—Cooke, l.c.

Prof. Moebius remarks:—"The vegetative cells are 14-16 μ broad, and 4-6 times as long; the supporting cells do not differ from the others. The oogonia have from a side view an almost hexagonal form; the side angles are, however, greatly rounded off, and the sides which these angles form are double as long as the upper and under side; the oogonium is 42 μ broad and 48 μ high; the aperture, which should lie somewhat above the middle, I found almost exactly in the middle. The oospores fill the oogonium, and are consequently approximately hexagonal, varying to rhombic; whilst in other cases (according to the descriptions) they are spherical, and consequently do not fill the oogonium. The dwarf males are seated upon the supporting cells, are 42 μ long, have a stalk somewhat curved at the base, and a 2-celled antheridium."

Fig. 10: Showing single and twin oogonia; *a*, androsporangia x 400.

Hab.: Burpengary, *Thos. L. Bancroft.* Found in Europe and North America.

Œ.? birmanicum, *Wittr.* Prof. Moebius places a query against this species, and says:—"The vegetative cells are 11-12 μ thick, 5-8 times as long; the supporting cell is double as thick above; the oogonia are apical, from spherical to elliptical (36-46 μ); the oospore (34-38 μ) almost fills the oogonium; the dwarf males have a single-celled, long stalk (8-36 μ), somewhat bent beneath; the antheridium is 1-celled (Fig. 9B). Since the spores were not wholly ripe, and the aperture of the oogonium was not to be seen, the determination is not certain. Nordstedt writes that the specimens remind him of *Œ. birmanicum* and *Œ. monile*."—Berk. et Harv.

Hab.: Burpengary, *Thos. L. Bancroft.* Also in the East Indies.

Œ. Pringsheimii, *Cramer.* Cooke's British Freshwater Algæ, 166; Plate LXIII., Fig. 2. Oogonia single or 2-6, continuous, somewhat egg-shaped globose, opening by an operculum with a very narrow and scarcely distinct fissure; oospores globose, not distinctly filling the oogonia; male plants a little slenderer than the female; spermagonia 2-10 celled; alternating with the vegetative cells in the upper part of the filament; terminal cell obtuse, or rarely shortly apiculate. Size: Cells, female, ·012-·02 mm., 2-4 times as long; cells, male, ·011-·016 mm., 2-4 times as long; oogonia, ·03-·043 x ·036-·45 mm.; oospore, ·028-·035 x ·028-·034 mm.; sperm. cell, ·01-·015 x ·006-·009 mm.—Cooke, l.c.

Note of Prof. Moebius:—"Vegetative cells 10-12 μ thick, 3-5 times as long, the supporting cell not different from them, or, when the oogonium is apical, distended (22 μ thick); oogonium globose-elliptical (27-32 μ broad, 37 μ long), oospore spherical (28-30 μ). Male specimens not seen; known in Europe, North America, Afghanistan. A variety, *hians*, Nordst., belongs to New Zealand. According to Nordstedt's communication, the specimens all remind him of *Œ. pachydermatosporum*, Nordst, *Œ. moniliforme*, Wittr., and *monile*."

Fig. 11: Showing oogonia x 400.—Cooke, l.c.

Hab.: Nines Waterholes, Myrtle, *Thos. L. Bancroft.* Also found in Afghanistan, Asia, Europe, North America, and New Zealand.

Œ. Boscii, *Le Clerc.* Cooke's British Freshwater Algæ, 167; Plate LXIII., Fig. 4. Oogonia single, rarely twin, oblong-ellipsoid, opening by a pore above the middle; oospores ellipsoid, by no means

filling the oogonia, longitudinally costate; male plants the same or nearly the thickness of the female; spermogonia 3-6 celled; spermatozoids binate; terminal cell slender and somewhat hyaline. Size: Cells, ·014-·02 mm., 4-6 times as long; oogonia, ·04-·045 x ·08-·1 mm.; oospore, ·036-·04 x ·06-·065 mm.; sperm. cell, ·013-·014 x ·006-·009 mm. —Cooke, l.c.

Note of M. Moebius:—"A species likewise diœcious, with male and female threads, of which only the latter were seen. Vegetative cells 12-16 μ thick, 6-10 times as long; the oogonium 44 μ broad, 74 μ long; the elongated elliptical spore, 41 μ thick, 60 μ long, does not fill the oogonium, but leaves an open space above and beneath. The oogonia lie singly; according to the descriptions they also occur in pairs, and open with a pore at the top. The male plants should be as thick as the female, the antheridia 3-6 celled, with two antherozoids each. Somewhat striking is the relatively considerable length of the cells in some Australian species."

Fig. 12: Showing oogonia x 400.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft*. Also in Europe and North America.

Œ. pachydermatosporum, *Nordst.* Prof. Moebius' note is as follows:—"A species not completely known. I observed only one thread with four neighbouring oogonia, which were 35-36 μ thick and 38-54 μ long, and still showed the opening with a pore above. The spherical oospores (32 μ) did not fill up the oogonia. The membrane of the oospores was smooth; perhaps, however, the oospores were not yet ripe, since in the ripe forms the membrane is often punctate. Nordstedt has, in his specimens from the Sandwich Islands (the plant is only known to occur there), seen amongst the female threads other threads with short cells, and conjectures that these are the male forms; he communicates to me the surmise that, according to Wittrock's view, this species is, perhaps, only a form of *Œdogonium moniliforme*, Wittr.

Hab.: Burpengary, *Thos. L. Bancroft*. And the Sandwich Islands.

Prof. Moebius then adds:—"Sterile *Œdogonia* of various sizes, and with different forms of cells, were collected at different places. Of these there may be mentioned only one form found at Burpengary, because it is remarkable in this respect, that the threads are prolonged into a hair consisting of several cells. The threads are straight and erect, about 1·5 mm. long; the cells in the inferior portion about 14 μ thick, 5-7 times as long; the last cell before the hair is suddenly considerably reduced in size in its upper portion, and here carries a large number of caps. The hair consists of 5-9 cells; the inferior are about 10 μ, the uppermost only as much as 6 μ thick; the intermediate ones are the longest. They are comparatively destitute of contents, yet there is to be noticed in every cell a nucleus in the centre and a reduced chromatophore. Such several-celled hairs occur also, for example, in Œ. *Huntii*, Wood, and Œ. *polymorphum*, Wittr. and Lund. Perhaps the present form belongs to the latter species.

"A peculiar *Œdogonium*, which very likely (as Dr. Nordstedt also considers) has experienced an arrest in its development owing to a parasite, is figured by me above (Fig. 9c). The whole plant consists of an inferior club-shaped cell, having a spherical distended cell above it, with a lid-shaped vertex (145 μ long); in the spherical cavity lies a

spinous sphere which most probably appertains to the parasite. I have upon several occasions observed these forms in a similar condition; they were likewise collected at Burpengary."

BULBOCHÆTE, Ag.

Filaments articulated, branched, joints thickened upwards, at or about the apex bearing setæ, which are straight, hyaline, colourless, more or less elongated, bulbous at the base, cell-membrane usually punctate; oogonia opening by a lateral pore above the middle; mature oospore red; monœcious or diœcious. Reproduction sexual, as in *Œdogonium*. In the diœcious species nannandrous (dwarf males).—Cooke's British Freshwater Algæ, 173.

B. elatior, *Pringsh.* The note of Prof. Moebius on this species is as follows:—"Amongst the other algæ were found abundantly isolated little plants, and especially the separated oogonia of this species in large numbers. The latter with the ripe oospores are, when seen laterally, spherical varying to polygonal, somewhat compressed at the upper portion, about 40 μ broad, and 32 μ high (Fig. 7). The support cell is divided by a wall thick above its base; both cells contain scarcely any endochrome. I have not observed male-sporangia; they ought, for the most part, to lie above the oogonia, more rarely in other positions; yet here I always found (except when it had fallen off) a hair on the upper portion of the oogonium. Not unfrequently two oogonia, one above the other, were found separated by a subdivided supporting cell—a fact which is not elsewhere recorded (Fig. 7B). The dwarf males, from two to six, are placed upon the supporting cells; the bottom cell is nearly pear-shaped (about 10 : 18 μ); the antheridium is an external one. The swarmspores are produced partly in the plants bearing sexual organs (Fig. 8, A. sp.), partly in special specimens without sexual organs. Either both the forms have in their vegetative cells the same dimensions (cells 10-15 μ broad, and 30-36 μ long), or the form without sexual organs has shorter cells (10-14 μ broad, 20-24 μ long), or it has obviously larger cells (16-20 μ broad, 66-83 μ long). The appearance of the last-mentioned form would confirm the observation of Pringsheim that the individuals without sexual organs frequently differ from each other in a more vigorous development—that is to say, larger dimensions of their cells."

Hab.: Burpengary, *T. L. Bancroft.*

Family IV.—ULOTRICHIACEÆ (Kuetz.), Borzi. em.

Algæ growing either in fresh water (*Ulothrix*), or marine or submarine (*Hormiscia*), or terrestrial (*Hormidium, Schizogonium*); either of a light-green or yellowish-green colour. Threads very shortly articulate, simple, very rarely dividing into single branches, free, now and then laterally connate in bands (*Schizogonium*). Primitive cells always many times longer than their diameter, after repeated division equal, or shorter (rarely a little longer), all fertile. Cell-membrane either thin (*Ulothrix, Hormidium*) or thick, sometimes very thick, and distinctly lamellose (*Hormiscia*). Cell-contents at first effused, parietal, including a starch granule, after simple or repeated division transmuted into gonidia. Gonidia of two kinds. Macrogonidia spherical, ovoid, or ovate-oblong, rounded at one pole and acute at

the other, furnished with 2 or 4 vibratile cilia, often germinating in the mother-cell without sexual fertilization. Macrogonidia much smaller, of similar form, furnished with two cilia at one extremity. Both kinds of zoogonidia produced within the cells of the threads, emitted either by a poriform opening in the mother-cell, or by the splitting or breaking up of the mother-cell.—Cooke's British Fresh-water Algæ, 178.

HORMISCIA, Ares.

Articulate thread fixed by the basal cell, which is attenuated downwards; simple, or now and then emitting branchlets. Cells abbreviated, enclosed by a thick cell-membrane, which is often manifestly lamellose. Cell-contents green, parietal, including an amylaceous granule. Propagation by macrogonidia and microgonidia.—Cooke, l.c.

The filaments are sometimes cylindrical, sometimes torulose like a rosary, in consequence of the barrel-like inflation of the separate cells; sometimes stretched out, sometimes frilled and interlacing each other, with a relatively thicker stratified membrane. Vegetative or asexual reproduction is effected by macrozoospores, which originate 1-4 in a cell, and after becoming covered with a transparent bladder make their exit through an opening formed in the lateral wall of the mother-cell. The macrozoospores are of a thick, short, pear-shape, furnished with four cilia, a coloured spot, and a contractile vacuole. After a time they come to rest, and fixing themselves by the mouth end they lose their cilia and envelop themselves in a membrane. The fixed end develops into a root-like, colourless organ of attachment; the free end growing into a club-shaped plantlet, through the cell, dividing into two by a cross partition, and each of these again in two, and so further. Sexual reproduction arises through repeated bipartition in each, from 8-32 and more, smaller microzoospores being produced. They have only two cilia, and after a swarming, for a time they conjugate laterally in pairs, forming a zygospore, which attaches itself by the end corresponding to the mouth of the microzoospore. It grows very slowly, and finally breaks up by the simultaneous division of its plasma into 2-14 swarmspores, which constitute the beginning of a new sexual generation. If any of the microzoospores remain behind in the mother-cells, they are able, without copulation, to germinate and grow into independent plants which may be seen singly or in groups projecting from the mother-cells.—Cooke, l.c.

M. Moebius says:—"The species of *Hormiscia* are difficult to distinguish. Stockmayer even wishes to include all freshwater forms of the old genus *Hormiscia* in one species, *H. zonata*; in this determination, however, he has not taken the thinner forms into consideration. The different threads of species of *Hormiscia* which I detected in several collections may be referred to two types—namely, those with longer cells and thin walls, and those with shorter cells and thicker walls. I distinguish them as":—

H. subtilis, (*Kuetz.*) *De Toni.* M. Moebius then proceeds:—"The appearance of the threads changes according to the relative length of the cells and the condition of the chromatophore, since the latter appears sometimes as a ring-shaped band in the middle, sometimes as a narrow mass lying close to one side, sometimes as almost entirely filling the cell; I can, however, lay no weight upon this distinction, because I am not sure that the alcohol has preserved the original

condition. The cells have a thin unstratified membrane, are 5-6 or 7-8 or 8-11 μ thick, and generally 2-3 times as long, rarely as long as the diameter. Sometimes the longitudinal walls are somewhat constricted in the middle. This species is in distinct varieties diffused everywhere throughout Europe. Nordstedt has determined in New Zealand the var. *tenerrima* (=*Ulothrix mucosa*, Thur.), the cells whereof are shorter or as long as the diameter.

Hab.: Fairfield, Burpengary, *Thos. L. Bancroft*. Also in Europe.

H. zonata, (*Web. et Moebius*) *Aresch.* More or less bright green, mucous, 2 or 3 ft. long, often less, either floating or interwoven; sterile cells equal or half their diameter; fructiferous cells usually a little longer than broad; cell-membrane thick, slightly constricted at the septa. Size: Cells, ·012-.04 mm.; macrozoospores, ·012-·018 x ·01-·012 mm.; microzoospores, ·005-·01 x ·004-·007 mm.—Cooke, l.c.

Fig. 13: *a*, *b*, threads in ordinary condition; *c*, portion of a thread, with one macrozoospore in each cell showing the red spot; *d*, macrozoospores free, with four cilia; *e*, macrozoospores in the resting state; *f*, macrozoospores germinating; *g*, plantlet of six cells; *h*, threads with ripe microzoospores; *h*2, with macro and micro zoospores; *i*, microzoospores free, with two cilia; *k*, microzoospores in conjugation; *l*, resting zygospores, the result of the conjugation of pairs of zoospores; *m*, portion of threads with growing plantlets, arising from uncopulated microzoospores left behind in the mother-cells; *n*, healthy zygospores eight months and nine days old; *o*, zygospore contents differentiating; *p*, in a latter stage; *q*, very large in two positions, showing zoospores; *r*, with zoospores elongating; *s*, see above.—Cooke, l.c.

Upon this species Prof. Moebius says:—"The cells are mostly 10 μ thick and half as long, rarely previous to subdivision of equal length—during active subdivision, moreover, only a quarter as long. The membrane shows two layers, since every cell has its own membrane, and the cell-filament is surrounded by a common envelope. The endochrome is distributed more or less symmetrically in the area shown. Here and there swellings of the filament were observed, and in the protuberant cells also longitudinal subdivisions (Fig. 13), so that the filament consisted of a double row placed side by side, or presented the appearance of two cohering filaments, exactly in the manner in which Kuetzing (Tab. phycol. II., 84) figures it for *Hormospora mutabilis* (Bréb.)."

Hab.: Burpengary, *Thos. L. Bancroft*. Also found in New Zealand, North America, and Europe.

CHÆTOSPHÆRIDIUM, Klebahn.

C. Pringsheimii, *Klebahn.* Prof. Moebius says:—"I had examined and described this alga when I became aware of Klebahn's discovery, which is communicated in the journal of the German Botanical Society (vol. ix. s. [7]); and from communications, drawings, and a preparation to which that well-known author, with great courtesy, permitted me to have access, I perceived that I had observed the same alga as he. Before this I believed that I had before me the plant which Nordstedt has indicated as *Aphanochæte globosa*, and under this name I have also made some communications upon it in the 'Biologische Centralblatt' (vol. xii., Nr. 3, s. 107). Although the

description does not completely tally, yet the representation which Nordstedt gives, without taking into account the existence of a gelatinous envelope and the want of empty connecting tubes, is of such a kind that a mistake seems easily possible.

Hab.: Burpengary, *Thos. L. Bancroft.*

"Therefore, I also class the alga under the Chætophoreæ instead of Aphanochæte, in which I am confirmed by Klebahn's views upon the systematic classification of *Chætosphæridium*, which I do not in all respects quite share. I allow the description to follow as I had originally written it, and refer for further details and for delineations to the copious work of Klebahn, which is to be found in Pringsheim's Jahrbücher.

"Its round cells adhere in colonies to *Coleochæte* and various filamentous algæ. The thallus consists chiefly of a globular cell, which at one pole rests upon the substratum, and at the other pole proceeds to a thin point, which is prolonged into an extremely long and thin hair, generally forming a large number of coils. This forms, moreover, a simple continuation of the cell-cavity (zellumen), and is not separated by a septum. In the inferior portion we find, almost filling up the cell, a chromatophore with a pyrenoid. The cell divides through a line lying in the plane of the equator; the inferior cell then tilts away and becomes converted into a shorter or longer tube, which at the end again swells out into a sphere. Then this sphere receives the whole of the protoplasm, becomes separated by a septum from the empty portion, and forms a hair at the other side. In the original cell from which we started the upper part arches into the inferior empty portion. I have not been able to observe that a second division occurs here, but I certainly saw cells entirely empty, which most probably originated in this way, so that the upper portion also forms a tube, and its protoplasm is emitted. From the division and formation of fresh cells originate colonies of globular cells with projecting hairs, which in some parts lie close together, and then are united by very short connecting pieces; in other parts they are more widely separated from each other, and then are united by long empty tubes. The cells have a diameter of about 9 μ. This diminutive size, as well as the circumstance that the alga most occurs amongst the branches of others, renders its observation difficult."

HERPOSTEIRON, Næg.

Thallus composed of jointed filaments, irregularly branched, lying flat, extending laterally, often more or less aggregated into an irregular layer; cells extended at the back or apex into a bristle, which is often considerably elongated, is jointed, without a sheath, and usually turgid at the base; bristles 1 or more. Propagation by zoogonidia and cysts; sexual reproduction hitherto unknown.

H. confervicolum, *Næg.* a.f. **typica.** Prof. Moebius says:— "The usual branched form grew pretty abundantly upon a sterile *Œdogonium*. The cells are nearly 5-10 μ thick, and of varying length; many are furnished with hairs. That the latter are unicellular and not provided with septa, but are yet separated from the supporting cell by a septum, I have already mentioned in another place (Biolog. Centralbl., vol. xii., Nr. 3, s. 98, Fig. 6); and I there also referred to

the occurrence of branched hairs. This form is known in Germany and South America; very probably, however, it is generally diffused in fresh water; perhaps also it is confounded with *Aphanochæte repens*, which Nordstedt specifies for the Sandwich Islands and New Zealand."

Hab.: Kelvin Grove, Enoggera Creek, *Thos. L. Bancroft.* Also in Europe and South America.

H. confervicolum, (*Næg.*) b.f. **bicellularis,** *Moebius* (n.form). Professor Moebius gives the following note:—"This form, which is distinguished by the fact that the thallus usually only consists of two cells, was found upon *Hormiscia subtilis* (Fig. 14). Both the cells are pointed at the end, so that the thallus appears spindle-shaped from above. Generally each of the two cells, but sometimes only one, carries a hair; longer pieces of filament were only exceptionally seen amongst the 2-celled portions. The latter are usually placed together in groups, so that the *Hormiscia* thread is covered with them along its length."

Hab.: Burpengary, *Thos. L. Bancroft.*

Prof. Moebius gives the following note in Latin:—"Thallus plerumque bicellularis, utraque cellula setosa." (Thallus generally bicellular, each cell furnished with hairs.)

STIGEOCLONIUM, Kuetz.

Articulate threads simply branched, branches and branchlets scattered, rarely approximate in a fasciculate manner, acute at the apex, sometimes attenuated into a colourless bristle, at times extended very long, at other times furnished with shortly subulate branches. Cell-membrane very thin and hyaline, homogeneous. Cell-contents with the chlorophyll arranged in transverse bands. Propagation by oospores or zoogonidia, the latter formed by division (4-16) of the cell contents; each zoospore furnished with a red parietal spot and four vibratile cilia.

S. amœnum, *Kuetz.* M. Moebius has the following note:—"Forms tufts 7-8 mm. in height; the cells at least of the inferior branches are clearly constricted at the septa; those of the principal stem 21-27 μ thick and 1-2 times as long. The branches occur mostly two by two, not opposite, but near together; the small branchlets are mostly given off singly. The cells of the stout side branches are 10-15 μ thick and 1-3 times as long; those of the terminal branches only 7-8 μ thick, and generally 3 times as long. The chromatophore forms in all the cells a narrow band in the middle. From the under portions of the head-branches proceed numerous long-jointed rhizoids. Hairs are wanting.

S. amœnum, var. novizelandicum, *Nordst.* The var. *novizelandica* differs from the typical form principally in the swollen joints constricted at the septa and the larger dimensions, for which reason I ranked the foregoing alga with it. Up to the present time it is only known in New Zealand; the typical form in Europe and North America."

Hab.: Kelvin Grove, Enoggera Creek, *Thos. L. Bancroft.* And North and South Islands, New Zealand.

S. australense, *Moebius* (n. sp.). Prof. Moebius says:—"Of this little alga, which was only observed in one complete specimen, I must make a new species, because none of the diagnoses of the known species are applicable to it; and I, moreover, have found no representation corresponding to it (Fig. 15). The numerous main branches proceeding from one side form a tuft 2 mm. high. The cells are cylindrical, somewhat thinner above than below; as a general rule, 6-7 μ broad and 2-5 times as long. The chromatophore almost entirely fills the cells. The larger branches are given off for the most part singly, rarely opposite, and are beset above with short side branchlets, which may also proceed in pairs from one side. The branching is compact, the sprays are perpendicular; the majority end in a long, several-celled hair. There were numerous cells in the neighbourhood of the branching taken up with the formation of swarmspores, then naturally swollen and divided into short joints. Rhizoids are wanting."

This being a new species, Prof. Moebius describes it in Latin, as follows:—"Thallus ad 2 mm. altus, ramis primariis fasciculatis, ramis secundariis plerumque alternis quoquoversum exeuntibus, erecto-patentibus, plurimis in pilos longos productis, ramis brevibus fasciculatis instructis; cellulis fere omnibus eadem magnitudine, 6-7 μ crassis, diametro 2-5 plo longioribus, cylindricis endochromate completis." (Thallus as much as 2 mm. high, main branches fasciculate, secondary branches for the most part alternate, given off in every direction, but extending perpendicularly, furnished with short fasciculate branchlets, and the majority lengthened into long hairs; the cells almost all of the same magnitude, 6-7 μ thick, 2-5 times longer than the diameter, cylindrical, and filled with endochrome.)

Hab.: Kelvin Grove, Enoggera Creek, *Thos. L. Bancroft.* On stones in flowing water.

CONFERVA (Linn.), Link.

Articulate threads simple, articulations cylindrical. Chlorophyllose mass homogeneous or granulate, including starch granules. Vegetation by division in one direction.

Propagation unknown (? by resting-spores, which subsequently produce zoogonidia).—Cooke's British Freshwater Algæ. 136.

"N. Wille has declared his belief in the universality of resting-spores in the whole genus *Conferva*, although it is hardly clear what is his conception of the limits of the genus. In a new species, which he has described under the name of *Conferva Wittrockii*, he gives detailed account of spore formation, which, it is presumed, may be accepted as a type of what usually takes place. The chlorophyllaceous contents contract, and become rounded. The colouring matter collects principally in the ends of the cells, so that the substance in the middle appears almost colourless; but after the contraction of the cell-contents the chlorophyllaceous portions of the protoplasm draw nearer together, until at last they coalesce and form a round or elliptical body within the mother-cell; they then begin to surround themselves with a membrane, which latter consists of two distinct layers. The spores are generally set free by the filaments resolving themselves into H-shaped cells (in which the cell-wall of each cell has a transverse fissure in the middle of the transverse walls): the spores then fall out. Sometimes they escape by the cell-walls becoming converted into mucilage, their layers becoming gradually indistinguishable. On first

germinating, the size of the spores increases, as the result of which the outer membrane bursts. The outer membrane consists of two pieces with pointed ends, one being much larger than the other, and covering it like the lid of a box. Afterwards, through the expansion of the inner membrane, the smaller piece of the outer membrane gives way, and the inner membrane grows through the aperture thus formed in the form of a tube. The development was not followed further, but the writer considers it probable that zoospores are first formed from the resting-spores."

In *Conferva bombycina*, var. *minor*, either single cells swell up into a barrel shape or here and there the contiguous ends of two neighbouring cells assume a club-like form. It is here that the largest part of the chlorophyllaceous protoplasm accumulates, and after this the swollen end is separated by a transverse wall from the longer narrow part of the mother-cell. The wall of the swollen part thickens later. The Author considers these cells to be resting-spores, although he was not able to observe their germination. *Conferva bombycina*, var. *genuina*, has similar resting-spores.

Three modes of formation of resting-spores of *Confervæ* have been observed (1) by rejuvenescence, and the formation of a new membrane round the contracting contents; (2) by the thickening of the membrane of the mother-cell; (3) by separation of a portion of the cell substance to a swollen part of the mother-cell, and the thickening of the membrane of this portion.—Cooke, l.c.

C. ? bombycina, *Ag.* Yellowish-green or green, soft, silky; articulations oblong-cylindrical, slightly constricted at the joints, before division three times as long as the diameter, collapsing alternately when dry. Size: Threads, ·006-·12 mm. diam.—Cooke's British Freshwater Algæ.

Prof. Moebius has placed a query against this species, and says:—"A certain determination of material preserved in alcohol cannot be made, for the contents of the cells are no longer maintained in their normal state, and the colour of the filaments, which likewise is of value as a characteristic feature, is no longer present. In appearance (cells somewhat constricted at the septa) and dimensions (cells about 7 μ broad, 2-3 times as long) the foregoing form agrees with *C. bombycina*, which seems to be distributed in all parts of the world. It has not yet, however, been assigned to Australia."

Fig. 16: Portions of thread x 400.—Cooke, l.c.

Hab.: Fairfield, *Thos. L. Bancroft*. Also in New Zealand and Europe.

Order II. SIPHONEÆ, Grev. em.

Family V. VAUCHERIACEÆ (Gray), Dumort.

Algæ monœcious (rarely diœcious), cæspitose, unicellular or bicellular. Thallus with terminal vegetation, utricle-shaped, elongated, more or less branched. Propagation either sexual by oospores fecundated by spermatozoids, or non-sexual by zoospores. Sporangium terminal, formed by the globosely clavate swelling of the tip of the thallus, cut off by a septum, contents dark-green, at length enclosing one large zoospore, densely clad with vibratile cilia. Oogonium lateral, sessile, or borne on a more or less elongated simple or partite pedicel; cytioplasm at length converted into a large oospore. Antheridium

lateral, sessile, or cut off by a septum from the upper portion of a lateral branch, in which numerous spermatozoids are generated, which at length become free. Spermatozoids oblong, furnished with two unequal cilia (except in one species).—Cooke's British Freshwater Algæ, 115.

VAUCHERIA, DC.

(Characters the same as given above for the family.)

The following is an abstract given by Dr. Cooke, l.c., of Dr. N. Pringsheim's description of the sexual reproduction in *Vaucheria*:—"Vaucheria, besides the asexual multiplication by zoospores, also exhibits a true sexual propagation, effected by means of the two organs known as the 'hornlets' and the spores, the latter being more correctly termed 'sporangium.' Both organs arise like papillary branches from the tube, and in close proximity. It is usually the case that the papilla destined to become the hornlet is formed sooner than that in which the sporangium originates. The two papillæ, even from the first, differ so widely in dimensions that they can scarcely be confounded. The papilla which becomes the hornlet soon elongates into a short cylindrical slender branch, which at first rises perpendicularly from the tube, then curves downwards until it comes in contact with the tube, often forming a second or third curve, and in this way always represents a more or less stunted branch, which frequently exhibits several spiral turns. The papilla of the neighbouring sporangium usually begins to appear at the time when the hornlet is commencing its first turn; but the period at which it arises is very indeterminate, for it sometimes appears much earlier, whilst the hornlet is still perfectly straight, sometimes much later after it has curved, so as to form two limbs of equal length.

"The papilla destined to become the sporangium gradually enlarges into a considerable-sized lateral outgrowth of the tube, far exceeding the hornlet in width, whilst in length it is barely equal to the straight limb of the latter. This outgrowth, which is afterwards symmetrical, ultimately throws out a beak-like prolongation on the side looking towards the hornlet, the rostrum of the sporangium, whence the latter acquires its peculiar form, resembling that of a half-developed vegetable ovule. Up to this period the hornlet as well as the sporangium are not shut off from the tube by the septum; the cavity of the hornlet and that of the sporangium consequently remain uninterruptedly continuous with the parent tube, and are filled with similar contents. A number of chlorophyll granules in an albuminous plasma and rounded oil globules constitute a dense lining to the tube, the sporangium, and the hornlet. Between this and the cellulose membrane is the thin, colourless cutaneous layer.

"At this stage a septum is suddenly formed at the base of the sporangium, which is henceforth an independent cell, completely separated from the parent tube. Even before this separation there may be noticed in the rostrate elongation directed towards the hornlet the gradual accumulation of a colourless fine granular substance, of the same nature as that with which the wall of the parent tube and the sporangium is lined on the inner surface, which has already been termed the 'cutaneous layer.' This accumulation in the forepart of the rostrum is continued after the formation of the septum between the sporangium and the tube, and, in consequence of its continued

increase, the remaining contents of the sporangium are by degrees pushed back towards the base. Whilst these phenomena are being manifested in the sporangium, the hornlet also undergoes remarkable changes. In its apex the contents, owing to the disappearance of the chlorophyll, have become almost colourless, more or less. Thus the point of the hornlet, like that of the sporangium, appears at this time to be filled with a colourless substance, which is not constituted by an accumulation of the cutaneous layer, but manifestly arises from a molecular change associated with an alteration of form and colour in the contents previously existing at the apex. So soon as the contents at the point of the hornlet have thus become colourless, they appear to be constituted of a very fine-grained, granulose-mucous substance. As soon as the transformation of the contents has taken place, the colourless apex of the hornlet is suddenly separated from the lower green portion by a septum, and is thus transformed into an independent cell without communication with the parent tube. The point at which the septum is formed is not very determinate, the portion cut off being sometimes larger, sometimes smaller.

"After the formation of the septum in the hornlet, the colourless mucous in its apex gradually assumes a more determinate form, and at this time a large number of minute, perfectly colourless, rod-like bodies may be readily perceived crowded together irregularly, and as it were embedded in the surrounding mucous. Close observation will disclose an indistinct movement exhibited even thus early by some of the little rods, from which their destination may be anticipated.

"This perfecting of the hornlet coincides with that stage of development of the sporangium at which the accumulation of the cutaneous layer in the anterior part of the rostrum has attained its greatest extent, and these conditions immediately precede the act of impregnation, which is effected in the following manner:—

"The pressure within the sporangium, especially in the direction of the rostrum, becomes greater and greater in consequence of the continued increase of the cutaneous layer in the forepart, until ultimately the membrane is ruptured exactly at the point of the rostrum, and allows a portion of the cutaneous layer to escape. The extruded portion becomes detached, and assumes the character of a drop of mucous, which remains lying near the opening of the sporangium, and ultimately perishes. The accumulation of the cutaneous layer in the forepart of the rostrum and the escape of a portion of it are merely the mechanism by which the opening is produced in the sporangium destined for the admission of the spermatozoids. Immediately after the formation of this opening in the sporangium, and in remarkable coincidence with the escape of the cutaneous layer through the rostrum, the hornlet opens at the apex and pours out its contents. Innumerable excessively minute rod-like corpuscles (·005 mm.), mostly isolated, escape at once through the orifice. Those already isolated exhibit an extraordinarily rapid movement in all directions, and those still embedded in the mucous do not become detached until afterwards, when they follow the others with equal rapidity. The field of view is soon covered with mobile corpuscles. In great numbers (20, 30, or more) they enter the neighbouring orifice of the sporangium, which they fill almost entirely, penetrating through the portion of the cutaneous layer remaining, which, though without any

definite boundary, offers a solid resistance to their further penetration into the sporangium. The corpuscles continue thus to struggle forward into the cutaneous layer for more than half-an-hour; bounding against its outer surface they retreat, again push forward, again retreat, and so on, in an uninterrupted succession of assaults and retreats.

"After this commotion has lasted some time, an abrupt boundary line suddenly appears in the outer aspects of the cutaneous layer, the first indication of a tunic forming around the contents of the sporangium, which were before bare. From this moment the mobile corpuscles are separated from the cutaneous layer by a membrane, which effectually prevents their further action upon the contents. They continue, it is true, to move to and fro, and this movement often lasts for hours together, but at last they perish in the rostrum itself. Even after the lapse of several hours the dead corpuscles may be seen in the rostrum, lying on the front of the sporangium, until at last they are completely dissolved, and all vestige disappears.

"The cutaneous layer surrounding the green contents of the sporangium becomes transformed, after impregnation, into the coat of the true spore, which, thus formed, represents a large cell occupying the whole of the sporangium, surrounded on all sides by the persistent tunic, which is open in front and prolonged into the rostrum.

"In this condition the spore remains for some time longer without being thrown off from the parent tube on which it was produced, but the colour of its contents gradually becomes paler and paler. The spore is at last rendered quite colourless, and presents in its interior only one or more largish dark-brown bodies. When it has lost all colour it is detached from the parent tube, in consequence of the decay of the membrane of the sporangium enclosing it. After some time, say three months, the spore suddenly resumes its green colour, and immediately thereupon grows into a young *Vaucheria* exactly resembling the parent plant."—Cooke, l.c.

V. geminata, *(Vauch.) Walz.* Dark or dull green, in dense intricate tufts; thallus capillary, tough, dichotomous. Oogonia 2 (rarely 1 or 3), ovate or obovate, opposite, distinctly pedunculate. Antheridia intermediate, subulate, more or less recurved. Mature oospore spotted with brown, sporoderm colourless, composed of three strata. Sporangia on the same or a proper thallus, broadly cup-shaped, truncate, and angularly horned. Size: Oospore, ·11-·12 x ·18-·19 mm.

Dr. Cooke records that J. P. Vaucher says "that this species (in Europe) is one of the most common, and is found in nearly all ditches, principally in the spring. It is loaded with little bouquets manifest to the unassisted sight, and which, with the microscope, seems to be formed of a common peduncle, subdivided into pedicels, each of which carries on its summit a spherical body, in every way resembling the grains of other ectosperms, but nearly half as small again. In the middle of this bouquet is the horn, which, without doubt, performs the function of a male flower, and which is here but a prolongation of the peduncle. The number of grains varies from 5 to 7, but commonly 4 are met with."

This plant is said to be most frequently (in Europe) infested with the curious parasite *Cyclops lupula*, of Muller, which occasions the growth on the filaments of such extraordinary-looking appendages, in the midst of which the parasite resides.—Cooke, l.c.

Fig. 17 : *a*, *b*, oogonia and antheridia, x 200 ; *c*, non-sexual spores x 200, after Walz ; *d*, mature oospores, x 200.—Cooke, l.c.

Hab. : Eagle Farm, Brisbane River, *Thos. L. Bancroft*. Also in Europe and America.

M. Moebius remarks :—"The organs of fructification were, for the most part, as yet undeveloped, yet isolated oogonia with ripe spores were observed. These are placed in pairs on short side-stalks, taking the antheridium between them. The main filaments had a diameter of 50-80 μ ; the oospores, with membrane consisting of three strata, were about 60 : 70 μ in size."

Order III. **PROTOCOCCOIDEÆ** (Menegh.), Kirchn.

Family VI. PALMELLACEÆ (Decn.), Næg. em.

Unicellular algæ in the broadest sense. Cells either solitary or more or less numerous, associated in families, vegetating by cell-division ; propagation by gonidia, which are produced from the ultimate generation of cells. Gonidia, when free, ciliate (usually with a pair of cilia), actively mobile.—Cooke's British Freshwater Algæ, 3.

SCENEDESMUS, Meyen.

Cells polymorphous, equal or unequal at the ends, often produced into a spine-like horn. Frond or family composed of from 2 to 8 oblong, fusiform, or elliptic cells, connected into a single or double continuous row ; propagating by means of the repeated segmentation, in parallel planes, in one or two directions, of each of the cell-contents into one or more broad families (not motile), set free by the bursting of the parent-cell wall.—*Nægeli ;* Cooke's British Freshwater Algæ, 33.

S. quadricauda, (*Turp.*) *Bréb.* Cooke's British Freshwater Algæ, 34. Cells oblong-cylindrical, each extremity obtusely rounded, 2-48, narrowly united, either in a single or double series, all straight, the outer cell at each end (and rarely some of the intermediate ones) armed at each extremity with a recurved spine. Size: Cells, ·0085-·01 mm. diam. to ·022 mm. long.—Cooke, l.c.

Prof. Moebius' note merely contains the remark :—"In isolated specimens. Very generally distributed, but not yet assigned to Australia."

Fig. 18 : Cells magnified 400 diameters.

Hab. : Burpengary, *Thos. L. Bancroft*. Ponds, Victoria Park ; Thompson Estate, Brisbane; and Zillmere, *W. J. Byram*. Also in Europe, America, Asia, and New Zealand.

CŒLASTRUM, Næg.

De Toni gives the following general description :—"Cœnobium globose, hollow within, formed of a single stratum of cells with spaces and perforations between them like a net. Zoogonidia first issuing from the mother-cell, then forming a daughter colony within that cell itself, and finally by the rupture of the mother-cell a free colony."

C. sphæricum, *Næg.* De Toni's description is:—"Cœnobia globose, or globose inclining to ovate, measuring as much as 90 μ in diameter, composed of 20 to 40 cells; cells almost hexagonal in circumference, prolonged outwards conically; generally 15 μ broad, spaces between the cells regular with 5-6 angles."

C. sphæricum, (*Næg.*) **var. compacta,** *Moebius* (n. var.). Prof. Moebius says:—"This form differs from the typical one in this respect, that the cells are less considerably prolonged outwards and form smaller triangular or quadrangular spaces between them (Fig. 19). The colonies are spherical, 30-40 μ thick; the cells with envelopes about 15 μ thick; the number of cells in a colony seem to amount to 16-32. The typical form is known in Europe, Argentine, Siberia, New Zealand." Prof. Moebius then adds the following Latin description:—"Coloniæ globosæ 30-40 μ crassæ, e cellulis 16-32 ca. 15 μ crassis, minus papillatis quam in formâ typicâ et spatia intercellularia minora trigona vel tetragona formantibus constitutæ. Hab. in aquâ dulci, Australiæ (Burpengary)." (Colonies globose, 30-40 μ thick, composed of from 16 to 32 cells, about 15 μ thick, which are less papillate than in the typical form, and form smaller triangular or quadrangular intercellular spaces.)

Hab.: Burpengary, *Thos. L. Bancroft.*

PEDIASTRUM, Meyen.

Cœnobium plane, frond-like, discoid, or stellate, free swimming, formed of cells in a single, rarely in the centre in a double stratum, continuous, or with the cells here and there interrupted, perforate or clathrate. Cells polygonal, central entire or slightly emarginate; those of the periphery entire or two-lobed, the lobes wedge-shaped, either single or two-toothed, sometimes elongated into a horn Cell-contents green, homogeneous at first, then granular.—*Rabh. Alg. Eur.* iii., 69; Cooke's British Freshwater Algæ.

P. tetras, *(Ehr.) Ralfs* (*P. Ehrenbergii,* Corda, in Cooke's British Freshwater Algæ). Cœnobium orbicular or oblong, perfectly closed, composed of 8-16 cells, or quadrate, of 4 cells, which are wedge-shaped, deeply-lobed and arranged in the form of a cross; cells of the periphery cuneate, truncate at the base, deeply bilobate; sinus narrow, lobes obliquely truncate, more or less notched, interior angles twice as long, all acute, or shortly appendiculate; central cells yellow-green, polygonal, one side repand or deeply notched. Very variable in size. The 4-celled cœnobia are often to be met with, mixed with desmids and other algæ.—Cook, l.c.

Fig. 19 bis: *a*, 4-celled cœnobia; *b*, 8-celled cœnobia; *c*, 8-celled cœnobium of unusual form, after Ralfs.

Hab.: Ponds, Thompson Estate, *W. J. Byram.*

RHAPHIDIUM, Kuetz.

Cells fusiform or cylindrical, generally very gradually cuspidate or acuminate at the ends, rarely obtuse, straight or variously curved, single, geminate, or fasciculately aggregate, decussate in the centre or radiately conjoined, rarely too laterally united at the end, other cells free. Tegument thin, smooth. Contents green, very finely granular, furnished with a central, or rarely lateral, transparent vacuole. Divisions of the cells only in one direction.—Cooke's British Freshwater Algæ.

R. polymorphum, var. falcatum, *De Toni* (*Ankistrodesmus falcatus*, Ralfs). Cooke, l.c. Fusiform, slender, acutely cuspidate at each extremity, curved or semi-lunar, 4-16 congregated in fascicles. Dr. Cooke says that the plant is very common in ponds, and resembles a minute young *Closterium*, except that, although some individuals may be solitary, others will be seen in the same gathering collected in the characteristic fascicles.—Cooke, l.c.

Fig. 19 ter.: *a*, families magnified 400; *b*, magnified 800 diam.

Hab.: Pools, Thompson Estate; Victoria Park, Brisbane; and Zillmere, *W. J. Byram.* Common also in Europe.

TETRASPOREÆ (Næg.), Kleb. ampl.

SCHIZOCHLAMYS, A. Br.

Cells globose (or ovate), either single or 2-4, associated in families; tegument lamellose, as age advances dividing regularly in 2-4 equal parts, some time adhering by means of a hyaline colourless mucous. Division in one or two directions. Zoogonidia produced by a repeated division of the cell-contents.—Cooke, l.c.

"The globular cells of this little alga produce a hyaline cell-membrane, which becomes removed to some distance from the green body of the cell by subsequent secretion of fluidish jelly; soon, however (probably from endosmose), becoming unable to withstand the expansion of the jelly, it splits in the direction of an equatorial circle by a clean line into two similar halves, or, if the dehiscence takes place by two circular lines, cutting at right angles into four similar pieces. This splitting and peeling of the membrane either coincides with a division of the internal cell-mass or it occurs without any such division. By frequent repetition of this process the cell gradually becomes surrounded by an accumulation of old fragments of the membranous shell, which are held together by the extremely transparent jelly set free. The division of the cell may be either a simple halving, in which case each part is immediately clothed again with a hyaline cell-membrane, or double through the cells produced by the first division separating immediately into two cells without previously acquiring a coat of cell-membrane, and therefore without skinning."—*A. Br.*; Cooke, l.c.

S. gelatinosa, *A. Br.* Cooke's British Freshwater Algæ, 11. Cells globose; contents green, granulose. Size, ·01-·0135 mm.

Prof. Moebius gives the following note:—"Cells 8-14 μ thick, generally to the number of four, surrounded by the burst envelopes of the mother cells. Small colonies were found amongst the cushions of *Coleochæte*."

Fig. 20: Cells magnified 400 diam.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft.* Also in Europe and North America.

PALMODACTYLON, Næg.

Cells globose, enclosed by thick vesiculose and frequently confluent envelopes, united into free swimming families, sacciform, microscopical, often disposed radiately. Propagation by vegetative bipartition of the cells; the division alternate; at the outset only in one direction, afterwards along all directions of the space. Cells of each generation motile, afterwards upon attaining quiescence repeatedly undergoing subdivision.

P. subramosum, *Næg.* Prof. Moebius says :—"Numerous specimens of different form and size were observed amongst other algæ (Fig. 21). In the most simple case four cells lie in a series; by further subdivisions wholly irregular curved tubes are formed, yet the groups are mostly to be distinguished by four cells. The cells are roundish, 8-14 μ thick (without envelopes); the tubes are as much as 34 μ thick."

Hab.: Burpengary, *Thos. L. Bancroft.* Also found in Europe.

TETRASPORA, Link.

Thallus gelatinous, membranous, or sub-membranous. in the beginning a short sac, afterwards expanded; cells globose or angular, more or less distant, but associated in a single stratum into large families. Tegument thick, very rapidly diffluent into a homogeneous mucous. Division in two directions in the same plane.—Cooke's British Freshwater Algæ. 15.

Prof. Moebius remarks:—"At Burpengary small fronds of undetermined form were found, which evidently belonged to a *Tetraspora*. The cells, grouped in fours, were 6-14 μ in size. Only the questionable *T. intricata*, Berk. et Harv., is referred to Australia (Tasmania)."

Of the Tasmanian species above alluded to, Harvey says in Tasm. Flora, vol. ii., p. 342:—"*Tetraspora intricata*, Berk. and Harv.—Fronde decomposito-laciniata, laciniis angustissimis ramosis, ultimis capillaribus intricatis, gonidiis quaternis. maculis ramulorum subuniseriatis."

Hab.: In the St. Patrick's River; 1830, *Gunn.*

The single specimen seen having been dried on paper, and very imperfectly displayed, it is impossible to do more than guess at its proper form. It seems to be cut up indefinitely into thread-like segments, the lesser ones containing often but a single row of quaternate gonidia. Mr. Berkeley remarks that it is related to the other *Tetrasporæ* much as *Monormia* is to the *Nostocs*. It approaches also to *Trypothallus*. We regret that the state of the specimen forbids its being satisfactorily described or figured. The gonidia are $\frac{1}{2000}$ inch in diameter.—W. H. Harvey, l.c.

Hab.: Burpengary, *Thos. L. Bancroft.*

BOTRYOCOCCUS, Kuetz.

Thallus botryoid (or like a bunch of grapes), irregularly lobed, mucous, involved in a thin parent membrane (?). Cells ovoid or elliptic, united in families, which are densely packed within a thin diffluent tegument.—Cooke's British Freshwater Algæ, 17.

B. Braunii, *Kuetz.* Small, free swimming, green, at length becoming pallid or reddish-brown. Size: Cells, ·01-·0125 mm.

From the Micro. Journ., 1870, p. 88, Dr. Cooke, l.c., gives the following interesting extract:—"Specimens were found by Dr. Moore floating on the surface of Lough Bray in long sheets of some yards in length. Mr. Archer remarked upon these 'that this was not an uncommon alga in moor pools, sometimes coating submerged sedges and the like with a greyish-green stratum; sometimes, however, suspended in the water in streaks, and often isolated. It passes through a red condition. More than once, when a single group or family of

this algæ, from gatherings kept for some time in the house, had turned up under a low power of the microscope, he had been to some extent deceived by the way in which it resembles some radiolarian rhizopod, strange as it may seem. The mucous matrix containing the families of cells seem not unfrequently to give off rather long, filiform prolongations, which stand out more or less radiantly, looking not unlike pseudopodia, and these are undoubted rhizopodæ containing chlorophyll. It might, indeed, be a good example of two objects, with no affinity in any respect to each other, still superficially simulating one another.'"

Prof. Moebius says:—"The families are 70-130 μ in size, of irregular roundish form. The cell-walls are brownish-yellow, the cells elliptical or somewhat wedge-shaped, 4 μ broad, 12-14 μ long, and somewhat more slender than usual."

Fig. 22: *a*, family group; *b*, single family; *c*, undergoing segmentation; *d*, free mature cells. All magnified 400 diam.—Cooke, l.c.

Hab.: Waterholes, Victoria Park, *Thos. L. Bancroft*. Also in Europe and North America.

PROTOCOCCUS, Ag.

Cells sphæroid, segregate; cytioderm thin, hyaline, without integument, swimming free, when not growing in water, forming a thin pulverulent stratum. Contents in the beginning homogeneous; then granular, green, or reddish. Propagation by mobile gonidia.—Cooke, l.c.

P. infusionum, (*Schrank*) *Kirchn.* Cells with envelopes, about 45 μ in diameter, generally distributed.—Moebius.

Hab.: Burpengary, *Thos. L. Bancroft*. Common in Europe.

Family.—VOLVOCACÆ.

Cœnobia mobile, globose, sub-globose, or quadrangular and flattened, produced from agile biciliate green cells, with a double contractile vesicle. Common tegument of the cœnobium hyaline, more or less ample. Propagation sexual or asexual. The sexual monœcious or diœcious, either all or some of the cells of the cœnobium exhibiting male and female characters. Male cells containing spermatozoids (antheridia); the female finally changed into a quiet oospore. Non-sexual propagation by means of motile gonidia (macrogonidia and microgonidia). These arise from the simultaneous and repeated division of the cell-contents (cytioplasm). Macrogonidia definite in number (2, 4, 8, 16, &c.), the larger oblong or rounded, with the anterior extremity more or less rostellate, with two cilia exserted through the membrane of the vesicle, furnished with a parietal red spot (eye spot) and often two contractile vacuoles. Microgonidia indefinite in number, much smaller, pale or dull green, or yellowish, with cilia at the apex, mostly even within the mother-cell, endued with rapid motion, and ultimately escaping by rupture of the membrane.—Cooke's British Freshwater Algæ.

VOLVOX, Linn.

Cœnobium sphærical, continually rotating and moving, looking like a hollow globe, composed of very numerous cells arranged on a periphery at regular distances, connected by the matrical gelatin;

furnished with a red lateral spot, two contractile vacuoles, and two long exserted cilia, all circumscribed within a common hyaline vesicle. Propagation, sexual or non-sexual. In the non-sexual certain distant cells greatly enlarge, divide into numerous parts, and evolve daughter-cœnobia within the parent cœnobia, which are ultimately set free. In sexual propagation certain masculine cells undergo a multipartite division into fascicles of mobile spermatozoids, which are contractile, pear-shaped, and biciliate, afterwards free. The female cells are enlarged, but do not undergo division; after fertilization they develop into motionless oospores, which are finally red, surrounded by a double epispore.—Cooke's British Freshwater Algæ.

V. globator, *Linn.* Cooke's British Freshwater Algæ. Larger cœnobia, with very numerous cells (12,000), always with daughter-cœnobia enclosed within the mother, evolved without sexuality; fructification diœcious; the male cœnobia nourishing numerous red fascicles of spermatozoa; the female cœnobia originating 20-40 sexual cells, which after fecundation are resolved into as many red globose oospores, surrounded by a hyaline stellate epispore (=*Volvox stellatus*, Ehr.). Size: Cœnobium as much as 1 mm. diam.—Cooke, l.c.

Fig. 22 bis.: *a*, *Volvox globata*, after A. W. Wills; *b*, and *c*, after Cohn, in Cooke's Freshwater Algæ, l.c.; *d*, complete antheridium; *e*, stellate resting-spores or oosphere x 400, *Volvox stellatus*.

Hab.: Still water, Victoria Park, *W. J. Byram.*

Speaking of the *Volvocineæ*, Dr. Carpenter says:—"The most remarkable example of this group in the well known *Volvox globator* (Fig. 22, bis., *a*), which is not uncommon in freshwater pools, and which, attaining a diameter of about 1-50th or even 1-30th of an inch, may be seen with the naked eye, when the drop containing it is held up to the light, swimming through the water which it inhabits. Its onward motion is usually of a rolling kind; but it sometimes glides smoothly along without turning on its axis; whilst sometimes, again, it rotates like a top without changing its position. When examined with a sufficient magnifying power, the Volvox is seen to consist of a hollow sphere, composed of a very pellucid material, which is studded at regular intervals with minute green spots, and which is often (but not constantly) traversed by green threads connecting these spots together. From each of the spots proceed two long flagella; so that the entire surface is beset with these lashing filaments to whose combined action its movements are due. Within the external sphere may generally be seen from two to twenty other globes of a darker colour, and of varying sizes; the smaller of these are attached to the inner surface of the investing sphere and project into its cavity; but the larger lie freely within the cavity, and may often be observed to revolve by the agency of their own flagella. After a time the original sphere bursts, and the contained spherules swim forth and speedily develop themselves into the likeness of that within which they have been evolved; their coloured particles, which are at first closely aggregated together, being separated from each other by the interposition of the transparent pellicle." To understand how the daughter-cœnobia are derived from the mother sphere. a search must be made over the surface of a full-grown cœnobium, which has no daughter-cœnobia enclosed in it. Such a search will probably disclose several cells larger than the rest; these are the originating cells of what is hereafter to become a new sphere.

In the first place, these enlarged cells divide into four, then into eight, dark-green cells, and thus form a disc-like group, which, by growing more rapidly in the middle than on the edges, soon becomes convex on the inner side. This process of cell-division and unequal growth goes on till the young cœnobium becomes a hollow sphere attached to the parent by the marginal cells of the hollow disc. At what exact period, or in what precise manner, the separation between the two takes place has not yet been determined.

The above, which is essentially a process of cell-subdivision or gemmiparous extension, is the ordinary mode of multiplication in Volvox, taking place at all times of the year, except when the sexual generation now to be described is in progress. Dr. Carpenter then describes the sexual generation as follows:—"Each sphere of *Volvox globator* (Fig. 22, bis. *b*) contains both kinds of sexual cells, so that this species ranks as monœcious. Both kinds of sexual cells are at first distinguishable from the ordinary 'sterile' cells by their larger size. The sperm cells (Fig. 22, bis. *d*) begin to undergo subdivision when they attain about three times the size of the 'sterile' cells. This, however, takes place not on the 'binary' plan, but in such a manner that the endochrome of the primary cell resolves itself into a cluster of very peculiar secondary cells (Fig. 22, bis. *d*), each consisting of an elongated 'body,' containing an orange-coloured endochrome, with a red corpuscle, and of a long colourless beak, from the base of which proceeds a pair of long flagella, as in the antherozoids of the higher Cryptograms. As the *sperm* cells approach maturity the aggregate clusters may be seen to move within them, at first slowly, and afterwards more rapidly; the bundles then separate into their component 'antherozoids,' which show an active independent movement whilst still within the cavity of the primary cell, and finally escape by giving way of its wall, diffusing themselves through the cavity of the Volvox-sphere. The *germ* cells (Fig. 22, bis. *b* and *c*), on the other hand, continue to increase in size without undergoing subdivision, at first showing large vacuoles in their protoplasm, but subsequently becoming filled with dark-green endochrome. The form of the 'germ-cell' gradually changes from its original flask-shape to the globular; and it projects into the cavity of the Volvox-sphere, at the same time acquiring a gelatinous envelope. Over this the swarming antherozoids diffuse themselves (Fig. 22, bis. *c*), penetrating its substance, so as to find their way to the interior, and in this situation they seem to dissolve away, so as to become incorporated with the endochrome.

"The product of this fusion (which is only 'conjugation' under another form) is a reproductive globule or oospore, which speedily becomes enveloped by an internal smooth membrane, and with a thicker external coat, which is usually beset with conical-pointed processes (Fig. 22, bis. *e*), and the contained chlorophyll gives place to starch and a red or orange-coloured oil. As many as forty of such 'oospores' have been seen by Dr. Cohn in a single sphere of Volvox, which thus acquires the peculiar appearance that has been distinguished by Ehrenberg by a different specific name, *Volvox stellatus*. Soon after the 'oospores' reach maturity the parent sphere breaks up, and the oospores fall to the bottom, where they remain until conditions become favourable for their germination. The germination commences, according to Kirchner, with the liberation of the spherical 'endospore' from its envelope, and with its division into four cells by

the formation of two partitions at right angles to one another. These partly separate, holding together only at one end, which becomes one pole of the globular cluster subsequently formed by cell-multiplication; the other pole only closing in when a large number of cells have been formed. The cells are then carried apart from one another by the hyaline investment formed by each; and the characteristic Volvox sphere is thus completed."

Order IV. CONJUGATÆ (Link), De Bary.

Family VII. ZYGNEMACEÆ (Menegh.), Rabenh.

Multicellular algæ. Cells cylindrical, equal at both ends; fructiferous cells more or less tumid or inflated, all closely conjoined in filamentous families, forming an articulated simple thread, with a central cytioblast involved in radiating protoplasm. Cell-walls lamellose.

Chlorophyll-mass effused, or of a definite form, often forming a spiral band. Vegetation by repeated transverse divisions. Propagation by zygospores, resulting from the conjugation of two cells. Conjugation taking place in three ways—lateral, scalariform, and genuflexuous.—Cooke's British Freshwater Algæ, 74

This family is subdivided into three sub-families according to the character of the reproductive process:—I. *Zygnemeæ*; II. *Mesocarpeæ*; and III. *Gonatonemeæ*.

Conjugation in the present family is the union of two cells, either of separate filaments or of the same filament, the result being the formation of a zygospore. The cells containing the male and female element cannot at present be distinguished from each other, although De Bary states that he has observed a constant difference between the fertile and sterile cells of a species of *Spirogyra*. Usually all the cells of one filament appear to be either giving or receiving cells, so that the male and female filaments would seem to be distinct, but this requires more certain confirmation, inasmuch as in such of the species of *Spirogyra* as exhibit lateral as well as scalariform conjugation all the cells in one filament cannot be of the same kind.

"The first perceptible change in a cell about to produce a resting-spore appears to be a loosening of the primordial utricle from the outer wall and a contraction of it upon the cell-contents, which thus are crowded together and more or less deformed. Simultaneously with this, or a little after or before it, the side wall of the cell is ruptured, and a little pullulation or process is pushed out, which directly coats itself with cellulose and rapidly enlarges to a considerable diameter, at the same time growing in length until it meets a similar process pushing out from an opposing cell or has attained as great a length as its laws of development will allow. When two processes meet they become fused together, the end walls are ruptured, and the contents of one cell passing over are received within those of the other, or else the contents of both cells meet within the connecting tube, and there fuse together. This is the more common mode of conjugation, in which two cells of distinct filaments become joined together by a connecting tube. It is evident that, if the filaments are fertile to their fullest extent, there will be as many of these connecting tubes as there are pairs of cells in the filaments, and a

ladder-like body will be formed—the original filaments corresponding to the side pieces, the connecting tubes to the rounds. Hence this method of conjugation has received the name of *Scalariform*.

"In the so-called lateral conjugation, instead of cells of different filaments joining, adjacent cells of one filament unite together to complete the process. The union of the two cells appears to take place in several ways. In accordance with one plan, connecting tubes pushed out from near the ends of the cells grow for a short distance nearly at right angles to the long axis of the filament, and then bend at a right angle to themselves, so as to run parallel to the filament cells. The ends of these processes are, of course, opposed to one another, and, coming in contact, fuse together so as to form a continuous tube for the passage of the endochrome. Another method by which neighbouring cells are sometimes connected is by the formation of co-adjacent pouch-like enlargement of the opposing ends, and a subsequent fusion of these newly-formed enlargements by the absorption of the end wall between them.

"There is still another method of conjugation—the so-called *Genuflexuous*—in which, instead of a connecting tube being formed as the medium of union, two cells of opposing filaments become sharply bent backwards, so that their central portions are strongly thrust forward as obtuse points, which, coming in contact, adhere, and allow of a passage-way between the cell being made by the absorption of their cohering walls."—Wood's Freshwater Algæ, p. 161; Cooke l.c.

Hassall says that the conjugation in *Zygnœmaceæ* results in the production of "a dark body of either an oval or circular form, and enveloped in membrane, which Vaucher, Decaisne, and Jenner regard as the true spores, but which Agardh declares resolve themselves after a time into zoospores, an opinion in which I concur, applying the term 'sporangia' to them." It need scarcely be added that this is erroneous, the resulting body germinating direct after a period of rest, and termed a zygospore.—Cooke, l.c.

MOUGEOTIA, Ag.

Cells with axile chlorophyll-plates. Copulation ladder-like. Zygospore drawn together in the swollen, bladdery, persisting middle space.—Cooke's British Freshwater Algæ, 99.

M. lætevirens, (*A. Br.*) *Wittr.* Prof. Moebius remarks:—"Only a short conjugating pair of filaments was found. The zygote lay in the conjugating canal, was 40 μ in height and 45 μ broad; the vegetative cells were 22 μ broad—dimensions which agree with those of the diagnosis. This species is representative of the section *Craterospermum* (A. Br.)"

Fig. 23 is Wittrock and Nordstedt's figure of the var. *varians.*

Hab.: Burpengary, *Thos. L. Bancroft.* Also in Europe and North America.

ZYGNEMA, Kuetz.

Cells with two axile, many-rayed, chlorophyll bodies standing near the central cell nucleus, each containing a starch-granule, or quite filled with dense granular contents, surrounding two starch-granules lying near the centre—(*a*) zygospore in the bladdery middle space between the ladder-like united pairing cells; (*b*) copulation ladder-like, or lateral between two cells of the same thread.—Cooke's British Freshwater Algæ, 76.

Z. leiospermum, *De Bary.* Cooke's British Freshwater Algæ, 82. Sterile cells equal in length and breadth, or sometimes twice as long. Zygospore globose or broadly oval, formed in one or two conjugating cells; membrane brown, even. Sporiferous cells a little swollen. Size: Cells, ·022 mm. diam.; zygospore, ·023-·03 mm.—Cooke, l.c.

Prof. Moebius' note is as follows—"Cells of the filaments very symmetrical, 22-24 μ thick, 1-1½ times as long, rarely somewhat shorter than the diameter, slightly constricted at the septa with two large clearly-defined star-shaped chromatophores in each cell. Spores not seen."

Fig. 24: *a*, portion of fertile thread x 400; *b*, *c*, fertile cells with zygospores x 400, after De Bary; *d*, mature zygospore x 400, after De Bary.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft*. Also in Europe and America.

Z. tenuissimum, *Grun.* Prof. Moebius says:—"This species is placed by De Toni amongst the 'species accuratius inquirendæ' (species requiring more accurate investigation). Its diagnosis—'Tenuissimum cell veg. 9 μ latis diam. 10 plo. longioribus endochromate in stellulas binas approximatas congesto' (very slender vegetative cells, 9 μ broad, 10 times longer than the diameter, the endochrome collected into minute stars lying two and two together)—tallies exactly with the foregoing form whose filaments had partly conjugated and formed zygotes. The zygote is spherical, 17 μ in diameter, and lies in the conjugating canal. In the latter relation consequently this species would also belong to the same group as the foregoing."

Hab.: Burpengary, *Thos. L. Bancroft*. Also in Europe.

The known species of which the spores are unknown is attributed by Grunow to Lower Austria.

Z. (Zygogonium) pectinatum, (*Kuetz.*) *Ag.* Sterile cells 1-2 times as long as broad. Zygospore globose or broadly elliptic, dark olive, scrobiculate, formed in the canal of conjugation. Size: Cells, ·03-·035 mm. diam. (sometimes less); zygospore, ·04 mm. diam. —Cooke's British Freshwater Algæ.

The following is Prof. Moebius' note:—"Vegetative cells somewhat constricted at the septa, swollen in the middle, 20-23 μ thick, 1-3 times as long, with brownish membrane and more or less thick gelatinous sheath. According to the dimensions of the threads, which are smaller than in the typical form, the foregoing alga should, perhaps, be classed as the variation *conspicua* (Hass.), Kirchn., but the spores were not seen."

Fig. 25: *a*, portion of sterile threads x 400; *b*, threads in conjunction x 200; *c*, zygospore x 400.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft*. Also found in Europe, North and South America.

Z. (Zygogonium) ericetorum, (*Kuetz.*) *Hansg.* Cooke's British Freshwater Algæ, 98. Sterile cells 1½ to 2 times as long as broad. Zygospores subglobose or oblong; sporoderm rather thick, even. Size: Cells, ·013 to ·018 mm. diam.; zygospore, ·013 x ·025 mm.—Cooke, l.c.

Dr. Cooke, who retains *Zygogonium* as a genus, says:—"The colour, no less than the condition of the endochrome, varies considerably in this species. In some specimens the filaments are of a

bright green, in which case they have always been found immersed in water; while in others, and more frequently, they are purple, of which colour they invariably are found spreading over swampy heaths."—*Hass.;* Cooke, l.c.

Z. (Zygogonium) ericetorum, f.a., *(Kuetz.) Hansg.* "Cells cylindrical, 24 μ thick, 3-4 times as long, without gelatinous envelope; spores not seen."—Moebius.

Hab.: Burpengary, *Thos. L. Bancroft.* Met with also in Europe and North America.

"Cells 18 μ thick, once to twice as long, at times with side sprays. Perhaps this is the var. *terrestris*, Kirchn., of which, according to Kirchner, such side sprays are characteristic; its spores are unknown. Very probably generally distributed; especially attributed to Europe and North America."—Moebius.

Z. (Zygogonium) ericetorum, f.b.

Hab.: Fairfield, *Thos. L. Bancroft.*

SPIROGYRA, Link.

Cells with one to several parietal chlorophyll-bands, usually spirally winding to the right. Copulation ladder-like (*Spirogyra*) or lateral (*Rhynchonema*). Zygospores always within the walls of one of the united cells. Copulating cells similar to the sterile ones, or swollen out.—Cooke's British Freshwater Algæ, 83.

This genus, as now accepted, includes two genera, as recognised by Kuetzing—*Spirogyra* and *Rhynchonema*. In the former the conjugation was scalariform, and in the latter it was lateral. It is now found that in many species, probably in all, both kinds of conjugation take place, according to circumstances. The same filament, which in some portions of its length conjugates with a neighbouring filament, has also been observed conjugating laterally between two of its own cells. The genus *Rhynchonema*, therefore, has thus been proved to represent only one of the modes of conjugation of the same plant, which under other conditions conjugates with a neighbouring filament. In past times too great importance was attached to the breadth and length of the cells in the sterile filaments, and also to the character of the spiral bands, features which are now known to be too variable to be relied upon, the most important and reliable characters being derived from the zygospore; hence only specimens in fructification can be accurately determined.—Cooke, l.c.

Prof. Moebius says:—"Numerous species of this order were observed; the majority were, however, I am sorry to say, sterile, and consequently incapable of being determined. Only two species were found in fructification."

S. punctata *(Clere)*, **var. tenuior,** *Moebius* (n. var.) Referring then to this species, he adds:—"This species belongs to the section *Conjugata*, Hansg. (with straight septa), and to the subsection *Monozyga*, Hansg. (where the canal of conjugation is only formed by one of the cells). It is distinguished by spores yellow at maturity, with granular middle membrane. In the typical form the vegetative cells are 24-27 μ thick, 6-12 times as long, with a chlorophyll-band of $3\frac{1}{2}$-7 spirals, the spores 35-37 μ broad, one and a-half times to twice as long. In the foregoing form the vegetative cells are only 18-20 μ thick, and

3-5 rarely as much as 8 times as long, with a chlorophyll-band of 3-5 spirals, the spores 30-32 μ broad and 66-70 μ long. I have on this account set it down as a distinct form. The species is known in Europe, North America, and Afghanistan."

This being a new variety, Prof. Moebius appends the following Latin description :—" Cellulis vegetativis 18-20 μ crassis, 3-5 raro 8 plo. diametro longioribus, chromatophori anfractibus 3-5, sporis 30-32 μ crassis, 60-70 μ longis. Hab. in aquâ dulci Australiæ (Burpengary)." (Vegetative cells 18-20 μ thick, 3-5 rarely 8 times as long as the diameter, chromatophore with 3-5 windings; spores 33-32 μ thick, 60-70 μ long.)

Hab.: Burpengary, *Thos. L. Bancroft.*

S. calospora, *Cleve.* Cooke's British Freshwater Algæ, 94. Sterile cells, with the extremities replicate, 6 to 12 times as long as broad; chlorophyll-bands 1 to 3, making $2\frac{1}{2}$ to 7 turns; spores elongate, obtuse ovoid, $1\frac{1}{2}$ to 2 times as long as broad; membrane yellow, scrobiculate, Sporiferous cells scarcely turgid.

Prof. Moebius gives the following remarks :—" This species belongs to the section *Salmacis* (Bory), Hansg., with replicate septa, and certainly to the species not possessed of smooth membrane to the spores.

"The vegetative cells are in the foregoing form :—About 27 μ broad, and 5-8 times as long, with a chlorophyll-band of 4-5 spirals. The sporiferous cells are somewhat turgid and shorter than the vegetative. The spores are elliptical, 30-36 μ broad, 64-70 μ long, in the ripe condition, brown with scrobiculate membrane, which in optical section appears streaked with fine radiation. The dimensions may vary in this species within certain limits, on which account Cooke assumes several forms for it."

Fig. 26 : *a*, sterile cells x 200 ; *b*, *c*, conjugating cells with zygospores x 200 ; *d*, outline zygospore x 400.—Cooke, l.c.

Hab.: Caboolture River, *Thos. L. Bancroft.* Also found in Europe and America.

Family VIII. DESMIDIACEÆ (Kuetz.), De Bary.

Unicellular algæ. Cells for the most part compressed, single, segregate or geminate, or a larger number united in a band or filament ; variable in form, usually constricted in the middle, so as to constitute two symmetrical semi-cells.—Cooke's British Desmids.

Minute unicellular algæ, inhabiting fresh water. Cells consisting of two symmetrical equal portions, their junction marked by a pale interruption of the endochrome, and frequently by a constriction, deroid of silex ; increasing by the formation of two new half-cells, interposed between the two halves of the older cell. Cells either becoming free or united into a filament. Endochrome green. Reproduction by conjugation of the contents of two distinct cells, which results in the production of zygospores, the contents of which afterwards become differentiated into young cells of a new generation. Ciliated zoospores (in one species only) produced by the conversion of the endochrome.—Cooke, l.c.

Prof. Moebius says :—" The majority of the Desmidieæ were derived from the collections from Burpengary ; yet here the species, for the most part only, occurred in isolated examples, on which account also the formation of zygotes was only observed on extremely rare occasions."

DESMIDIUM, *Agardh.*

Filaments 3-4, angular or compressed, regularly twisted, joints bidentate or bicrenate at the angles or lateral margins, and either closely united throughout the whole of their end margins by a thickened border, or only at the outer portion of each by mutual projections, and thus producing intervening central oval foramina.—Archer, in Pritch. Infus. ; Cooke, l.c. .

D. quadrangulatum, *Ralfs.* Cooke, l.c., 11. Filament quadrangular, varying in breadth from its twisting, having two longitudinal waved lines ; joints in front view broader than long, with two somewhat rounded crenatures on each lateral margin, united by the whole of their end margins ; end view quadrangular ; endochrome four-rayed. Size : Diam., 50-60 μ (W.) ; 24 x 57 μ (D.) ; 55 μ (R.).

Prof. Moebius gives the following note :—"The cells completely agree in their shape with the typical form. (Compare the figure in Ralfs' British Desmids.) They have, however, smaller dimensions, so that they have only half the breadth assigned to them—namely, 30 μ broad and $\frac{1}{2}$-$\frac{2}{3}$ as long. There were only isolated fragments of the filaments seen."

Fig 27 : *a*, living cells ; *b*, empty cells ; *c*, transverse views.—From Cooke's British Desmids.

Hab. : Burpengary, *Thos. L. Bancroft.* Also found in Europe, North America, and Brazil.

SPHÆROZOSMA, Corda.

Filament compressed ; joints deeply divided on each side, thus forming two segments, and giving a pinnatifid appearance to the filament, united to each other by a narrow isthmus or by glandular processes. Sometimes enclosed in a mucous sheath. Zygospores globose or oval, smooth.—Cooke's British Desmids.

S. filiforme, (*Ehr.*) *Rabh.* Cooke's British Desmids. Joints about as long as broad ; constriction acute ; segments elliptic, and united by double slender processes, which include a quadrate foramen between each pair. Size : Diam., 12-18 μ (W.) ; 12-14 μ (K.).

Fig. 26 bis. : *a*, living cells ; *b*, *c*, empty cells.—Cooke, l.c.

Hab. : Still water, Thompson Estate, *W. J. Byram.* Also Ireland, Germany, and Sweden.

HYALOTHECA, Ehr.

Filament cylindrical, very gelatinous ; joints having either a slight constriction, which produces a crenate appearance, or a grooved rim at one or both ends, which forms a bifid projection at each side ; end view circular ; endochrome radiate. Zygospores round, smooth.—Archer, in Pritch.; Cooke's British Desm., 7.

H. dissiliens, (*Smith*) *Ralfs.* Cooke, l.c. Filament fragile, crenate ; joints usually broader than long, with a shallow groove round each, dividing the endochrome into two portions. Zygospore globose, smooth, placed between the persistent connecting tube formed by the mutual fusion of a fresh extension from and produced between the sides opposed to each other of the conjugating pairs of joints, the filament having previously broken up into single joints. Size : Diam., 20-36 μ (W.) ; 22-34 μ (K.) ; 14-25 μ (R.) ; zygospore, 25 μ.—Cooke, l.c.

Prof. Moebius remarks:—"The proportion of the length of the cells to their breadth varies in this species; generally they are nearly half as long as broad. In this case the length amounted to about two-thirds of the breadth (12-14 μ long, 16-20 μ broad). Moreover, after experiments had been made in staining no trace of a gelatinous envelope was to be seen. This seems, indeed, in the typical form to be regularly present, but is wanting in the var. *tatrica*, Racib., which is distinguished from the foregoing form by the fact that in it the cells are almost as long as broad.

Fig. 28: *a*, living cells; *b*, empty cells; *c*, transverse views; *d*, zygospore.—From Cooke's British Desmids.

Hab.: Burpengary, *Thos. L. Bancroft.* Also found in Europe, North America, Siberia, and Thibet.

ONYCHONEMA, Wallich.

Filament compressed; margins inciso-serrate; joints deeply constricted, and united to each other by diverging sub-capitate processes (cornua).—Cooke's British Desmids, 6.

This remarkable form of the overlapping and alternating horns (cornua), and the uncinate processes given off from the extremities of the segments, at once distinguishes this genus from all others.—Cooke, l.c.

O. filiforme, *(Ehr.) Roy et Bisset.* Prof. Moebius gives this note:—"In isolated fragments of filaments, the cells of which were 12-14 μ long, and equally broad. These dimensions tally with those attributed to the typical form; Nordstedt's examples from New Zealand were somewhat larger."

Fig. 29: From Otto Nordstedt's New Zealand Freshwater Algæ.

Hab.: Burpengary, *Thos. L. Bancroft.* Also met with in Europe, North America, New Zealand, Japan, and Burma.

GYMNOZYA, Ehr.

G. moniliformis, (*Ehr.*) "Typical form cells 21-28 μ long, 16-19 at the end, 11-14 μ broad; the outline of the membrane very indistinct."—Moebius.

Hab.: Burpengary, *Thos. L. Bancroft.* Also found in Europe, North America, Java, Siberia, New Zealand, Brazil, the Sandwich Islands. A var. *gracilescens* in Brazil and New Jersey.

CYLINDROCYSTIS, Meneg.

Cells involved in gelatin, cylindrical, with rounded ends, and without constriction. Endochrome at length radiating from a single axile chlorophyll body in either half. Zygospore quadrate, elongate, or globose.—*De Bary*; Cooke's British Desmids, 46.

C. Brebissonii, *Meneg.* (*Penium Brébissonii*, Ralfs, in Cooke's British Desm., 43). Frond smooth, cylindrical with rounded ends, transverse central band inconspicuous, zygospore at first quadrate, finally orbicular, conjugating fronds persistent. Size: Diam., 16-17 μ (W.); diam. 15-30 μ (K.).—Cooke, l.c.

The following is Prof. Moebius' note:—"Cells 25 μ broad, 60 μ long, with broad rounded ends." (Corresponding to Fig. 6*c*, Pl. XXV. in Ralfs' British Desm.)

Fig. 30: *a*, *b*, living fronds; *c*, empty fronds; *d*, young zygospore; *e*, ripe zygospore.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft.* Found in Europe, America, and Asia.

CLOSTERIUM, Nitsch.

Fronds elongated, attenuated, more or less lunately curved or arcuate, entire, not constricted at the middle, the junction of the segments marked by a pale transverse band. Endochrome often arranged in longitudinal fillets, and at each extremity having a terminal clear space, in which are active granules; empty frond smooth or with longitudinal striæ, never granulated.—*Archer, in Pritch. Inf.*; Cooke's Brit. Desm., 17

C. gracile, *Bréb.* Cooke's Brit. Desm., 22. Frond very slender, about twenty-five to thirty times as long as broad, linear, nearly straight, except at the extremities, which are curved downwards, sides parallel, ends obtuse, endochrome arranged in a zigzag or sub-spiral manner. Empty fronds without striæ. Zygospore globose, smooth. Size: 0·15-0·2 mm. x 5-6 μ; 0·2-0·35 mm. x 8 μ (C.); diam. 5-6.

Prof. Moebius says:—"Besides the typical form (5-6 μ broad, 133 μ long) a still smaller form was observed, which was scarcely 4 μ thick and 9 μ long. It would agree according to the dimensions rather with *C. Lundelli*, Lagh., which differs from *C. gracile*, especially in the form of the zygotes. These were, however, not seen."

Hab.: Burpengary, *Thos. L. Bancroft.* And in Europe, North America, and New Zealand.

C. juncidum, *Ralfs.* Cooke's British Desmids, 30. Fronds very slender, fifteen to even thirty-five times as long as broad, linear, straight, except towards the extremities, which are somewhat curved downwards, ends obtuse, empty frond nearly colourless, striæ not numerous, faint; transverse suture usually 3. Zygospore orbicular, smooth. Size: 0·22-0·37 mm. x 5 μ (R.); 0·22-0·46 mm. x 7-14 μ (D.); diam., 11-12 μ (W.).—Cooke, l.c.

Prof. Moebius says:—"This species is very variable in the length of the cells; I found them 11-16 μ thick in the middle and 156-350 μ long."

Fig. 31: *a*, living cells; *b*, empty cells; *c*, zygospore.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft.* Also found in Europe, Asia, and America.

C. acerosum, (*Schrank*) *Ehr.* Cooke's British Desmids, 20. Frond slender, six to fifteen times as long as broad, linear lanceolate, gradually tapering; upper margin slightly convex; the lower nearly straight, slightly inclined upwards at the conical ends; large granules in a single central longitudinal series; fillets several, distinct; empty frond colourless, very faintly striated, central suture evident; zygospore orbicular, smooth, placed between the dehiscing empty fronds. Size: 0·15-0·42 mm. x 17-40 μ (R.); 0·35-0·42 mm. x 22-50 μ (A.); diam., 35-62 μ (W.).

Prof. Moebius' note is as follows:—"Rare, 52 μ broad, 715 μ long; cell-membrane smooth. In the latter respect statements vary. Ralfs (Brit. Desm.) says that the striæ are wanting, or are faint; according to Kirchner (Algæ of Silesia), the cell-membrane is mostly distinctly striated; according to De Toni (Sylloge), smooth or generally very clearly striated. The species seems to occur everywhere, but it has not yet been attributed to Australia. To the localities mentioned by De Toni, I can add **Java.**"

Hab.: Caboolture River, *Thos. L. Bancroft.* Also found in Europe, Japan, Burma, and New Zealand.

C. acutum, *Bréb.* Cooke's British Desmids, 35. Frond small, slender, from six to twenty times as long as broad, narrow lanceolate, slightly curved, gradually attenuated, ends acute; empty frond colourless, without striæ; zygospore somewhat quadrate in front view, end view elliptic. Size: 0·14 mm. x 10 μ (R.); 0·11 mm. x 12 μ (N.); diam., 9-11 μ (W.).

Prof. Moebius' note is as follows:—"Agreeing in form and dimensions with those laid down: 11-12 μ thick, 135-150 μ long."

Fig. 32: Figure from Berkeley's Cryptogamic Botany, page 120.

Hab.: Burpengary, *Thos. L. Bancroft.* Also found in Europe, North America, Greenland, Nova Zembla, Burma, and New Zealand.

C. lineatum, *Ehr.* Cooke's British Desmids, 31. Fronds slender, elongated, eighteen to twenty or twenty-five times as long as broad, gently curved, very gradually attenuated; upper margin unequally convex, being most curved near the ends; lower concave, or somewhat protuberant at the centre; sides somewhat parallel for a portion of their length; extremities gradually tapering, slender, curved downwards, ends obtuse; large granules in a single series; empty frond reddish; striæ numerous, distinct, one or more transverse line at the suture; zygospore double, rounded smooth. Size: 0·5 mm. x 26 μ (R.); 0·43-0·72 mm. x 21-28 μ (D.); diam., 24-36 μ (W.).

Prof. Moebius gives the following note:—"28 μ broad, 530 μ long; membrane brownish, finely striated longitudinally, with two transverse striæ in the middle."

The var. *sandvicensis*, Nordst. (Sandwich Islands and New Zealand), differs by the more densely set striæ, a more brownish or reddish membrane, greater protuberance in the middle, and larger dimensions (36-40 μ thick); it was not observed amongst the Australian Algæ.

Hab.: Burpengary, *Thos. L. Bancroft.* Also found in Europe, North America, Japan, and New Zealand.

C. Dianæ, *Ehr.* Cooke's British Desmids, 26. Fronds slender, six to eight times as long as broad, crescent-shaped, much curved, rapidly attenuated, upper margin very convex, lower very concave without a central inflation; ends sub-acute, with a very slight emargination at the upper outward extremity; large granules in a single series; empty frond somewhat straw-coloured, or faintly reddish, without striæ, suture evident; zygospore globose, smooth. Size: 0·17 mm. x 20 μ (R.); 0·11-0·3 mm. x 10-25 μ (D.); diam., 16-20 μ (W.); zygospore, 36 μ (L.).

Prof. Moebius' note is as follows:—"Cells 15-24 μ thick, 200-300 μ long; membrane faintly brownish, very finely striated. A widely-distributed species: Europe, North and South America, Asia, Sandwich Islands, New Zealand. Of a species resembling *C. Dianæ* I saw two specimens in conjugation. The zygospore was quadrangular, with uneven sides and corners considerably rounded, consequently very probably abnormal or imperfectly formed; its diameter amounted to 18:22 μ. The conjugating cells were 9 μ broad in the middle and 86 μ long; its membrane resembled that of *C. Dianæ*."

Fig. 33: *a*, living; *b*, empty cell.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft.* Also found in Europe, North America, Brazil, and New Zealand.

C. parvulum, *Næg.* "Cells 9 μ thick, 70 μ long; the zygospores (not observed) are globular (according to delineation in Wolle Desm. U.S., Pl. VIII., Fig. 16)."—Moebius.

Hab.: Burpengary, *Thos. L. Bancroft.* Also found in Europe, North America, Greenland, Siberia, and the Sandwich Islands.

C. Ehrenbergii, *Meneg.* Cooke's British Desmids, 23. Frond large, stout, about five or six times as long as broad, lunate, extremities tapering, upper margin very convex, lower concave with a conspicuous central inflation, ends broadly rounded; large granules numerous, scattered; fillets several; empty frond colourless, without striæ; central suture not evident; zygospore orbicular, smooth. Size: 0·37 mm. x 60 μ (R.); 0·32-0·5 mm. x 57-80 μ (D.); diam., 75-110 μ (W.).

Prof. Moebius says:—"Besides the typical form with clearly inflated centre (92 μ thick, 540 μ long), I frequently found specimens which did not show this inflation, or only showed indications of it, and were consequently more nearly allied to *C. Malinervianum*, De Not. (60-90 μ thick, 400-570 μ long, membrane smooth and colourless). As transitional forms exist, it seems to me better to treat it only as a variety of *C. Ehrenbergii*, as Rabenhorst has also done.

Hab.: Burpengary, *Thos. L. Bancroft.* Also met with in Europe, North and South America, Jamaica, Japan, and New Zealand.

Prof. Moebius says:—"*C. Ehrenbergii* is known in Europe, North and South America, New Zealand, and Japan; *C. Malinervianum* only in Europe." He also adds:—"Nordstedt mentions also, amongst his New Zealand Algæ (p. 69), a *C. moniliforme* (Bary), Ehr., whose centre was only very little inflated. This species very much resembles the foregoing, but has smaller dimensions, 36-55 μ, rarely as much as 72 μ thick."

C. Kuetzingii, *Bréb.* Cooke's British Desmids, 34. "In the centre 16 μ broad, thinned away at the colourless ends to 2 μ, as much as 530 μ long, distinctly striated in the centre."—Note of Prof. Moebius.

Hab.: Burpengary, *Thos. L. Bancroft.* Also found in Europe, North America, Japan, and New Zealand.

C. setaceum, *Ehr.* Cooke's British Desmids. Frond very slender, twenty to twenty-five times as long as broad, narrow lanceolate, upper and lower margins nearly equally and but slightly convex; each extremity tapering into a very long slender, setaceous, colourless beak, longer than the body, ultimately curved downwards, ends obtuse; empty fronds colourless, striæ close, faint; central suture solitary; zygospore cruciform. Size: 0·21 mm. x 10 μ (R.); 0·36-·05 mm. x 18-32 μ (D.); diam., 10-11 μ (W.).

Fig. 33 bis.: *a*, living cell; *b*, empty cell; *c*, formation of zygospore. —Cooke, l.c.

Hab.: Ponds, Thompson Estate, *W. J. Byram.* Also found in England, Wales, Scotland, France, Germany, Italy, and the United States of America.

PENIUM, Bréb.

Frond elongate, straight, cylindrical, elliptic, or lanceolate, either not at all constricted or but very slightly narrowed at the middle, entire. Endochrome with or without a terminal clear space, containing active granules.—*Archer, in Pritch. Infus.*; Cooke's British Desmids, 38.

P. closterioides, *Ralfs.* Cooke's British Desmids, 41. Frond rather large, about six times as long as broad, smooth, fusiform, or lanceolate; ends broadly rounded; endochrome in distinct longitudinal

fillets, interrupted only by the central transverse pale band with a single longitudinal series of large granules and a rounded clear space close to the ends, in which are active granules; zygospore globose, smooth. Size: Diam., 40-44 (W.); diam., 40-44 μ; zygospore, 46-56 μ (K.).

"The form found most nearly approaches this species. It is, however, appreciably thinner (only 30 μ broad as compared with 40-44 μ, 200 μ long)."—Moebius.

Fig. 34: *a*, living frond; *b*, empty fronds.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft.* Also found in Europe, North America, Burma, and Brazil.

TETMEMORUS, Ralfs.

Frond elongated, straight, cylindrical, or fusiform, constricted at the middle; segments more or less tapering, not inflated at the base; ends with an acute incision, the subdivisions rounded, otherwise quite entire.—Cooke's British Desmids, 48.

T. Brebissonii, *Ralfs.* Cooke's British Desmids, 48. Frond in front view with parallel sides, in lateral view fusiform; ends without any projecting processes; puncta in longitudinal lines. Size: Diam. 18-20 μ (W.); diam., 17-30 μ (K.); length, 194 μ; diam., 28 μ (D.).

T.B., var. attenuata, *Nordst.* Prof. Moebius says:—"The cells in this form seen from the front (where the incision is visible at the end) are attenuated towards the ends, whilst in the typical form they are cylindrical. The dimensions (22-24 μ broad, 14-17 μ at the end, 110-140 μ long) are somewhat smaller than those found by Nordstedt. This variety is only known in New Zealand, whilst the typical species was found in Europe and North America."

Hab.: Burpengary, *Thos. L. Bancroft.* Also met with in New Zealand.

T. B., var. tenuissima, *Moebius* (n. var.). Prof. Moebius remarks:—"As a particular variety, I may indicate a form rarely observed, which is at once readily connected with *T. Brébissonii*; the cells have a sharp constriction in the middle, and are at the widest part only 12-14 μ thick; the semi-cells approaching a cylindrical form, but somewhat drawn in towards the end; the ends are truncate with conspicuous incision; cells 128 μ long; the membrane beset, as in the typical form, with fine puncta arranged in longitudinal rows. (Fig. 35.)"

Prof. Moebius adds a Latin description:—"Cellulis 128 μ longis, 12-14 μ latis, medio acute constrictis, semi-cellulis sub-cylindricis ante apicem paullum constrictis, membrana punctis longitudinaliter ordinatis ornata." (Cells 128 μ long, 12-14 μ broad, with acute constriction in the middle; semi-cells sub-cylindrical a little constricted towards the apex; membrane furnished with puncta arranged longitudinally.)

Hab.: Burpengary, *Thos. L. Bancroft.*

TRIPLOCERAS, Bailey.

The general characteristics of this genus are given by De Toni (Sylloge), as follows:—"Cellulæ rectæ, valde elongatæ, prominentiis numerosis serratæ, apicibus trilobis, lobis bidentatis." (Cells straight, considerably elongated, serrated with numerous protuberances, the apices three-lobed, the lobes bidentate.)

T. gracile, *Bailey.* Prof. Moebius gives the following note:—"Very isolated, only seen in a few complete semi-cells. These were 14 μ broad and 240 μ long, and corresponded to the 'forma paullo gracilior,' Nordst., with two-lobed end. (Compare Nordst. N. Zeal. Alg. tab. vii., fig. 12.) Known in North America, India, New Zealand. The varieties indicated by Nordstedt are all derived from New Zealand."

Fig. 36: Nordst. fig. l.c., reproduced.

Hab.: Burpengary, *Thos. L. Bancroft.* Ponds, Victoria Park, Brisbane, *W. J. Byram.* Found also in America, India, and New Zealand.

DISPHINCTIUM, Næg.

De Toni gives the following general description:—"Cells straight, cylindrical, ovate, or fusiform with truncate or rounded ends, the central constriction being usually imperceptible or of little depth; the semi-cells without basal inflation or longitudinal striae. Chromatophores parietal or axillary, one (or two) in each semi-cell containing in the centre a pyrenoid (rarely two). Propagation of the cells by vegetative binary subdivision. Reproduction by zygotes."

D. cylindrus, (*Ehr.?*) *Næg.*; *Penium cylindrus,* Bréb., in Cooke's Brit. Desm. Frond minute, reddish, three or four times as long as broad, cylindrical, not contracted at the middle, ends rounded-truncate, rough, with minute, closely-scattered, pearly granules; empty fronds red; zygospore globose, smooth. Size: Diam., 13-20 μ; zygospore, 20 μ (K.); length, 50-57 μ; diam., 25 μ (D.).

"In isolated very small specimens, which, in appearance, correspond entirely with the Fig. 2*a*, Pl. XXV., Ralfs' Brit. Desm., but are only 9-10 μ thick (as compared with 13-20 μ in the typical form), and three times as long."—Moebius. Hitherto only known in Europe.

Fig. 37: *a*, *a*, living fronds; *b*, empty frond.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft.* Also in Europe.

PLEUROTÆNIUM, Næg.

De Toni gives the following general description:—"Cells straight, cylindrical, longitudinally striated, truncate at the ends; semi-cells inflated prior to constriction, membrane replicate at the base, not longitudinally; chromatophores parietal, not axillary, minute cavities at the ends, furnished with corpuscles in active vibration, as in *Closterium.* Multiplication as in other desmids."

P. Ehrenbergii, (*Ralfs*) *Delp.* This species was one of the most abundant observed; the size is pretty variable, but the dimensions agree with those laid down: 25-35 μ broad, 180-540 μ long.

Fig. 38: *a*, living cell; *b*, empty cell; *c*, zygospore.—Cooke's British Desmids. (*Docidium Ehrenbergii.*)

Hab.: Burpengary, Fairfield, Queen's Park, *Thos. L. Bancroft.* Ponds, Thompson Estate, Brisbane; and Townsville, *W. J. Byram.* Also in Europe, Java, North and South America, Siberia, Senegal, and New Zealand.

P. nodosum, *Lundell.* (*Docidium nodosum,* Bail.) Cooke's British Desmids. Frond stout, suture forming a rim; segments three or four times as long as broad, with four prominent inflated nodes, including the basal, which is somewhat the largest, and which are due to so

many whorls of knot-like prominences or large tubercles; ends entire, end view crenate. Size: 0·3-0·395 mm. x 48-54 μ; apex, 30-39 μ; diam., 45-55 μ in centre (W.).—Cooke, l.c.

Fig. 38 bis.: *a*, living cell; *b*, empty cell.—Cooke, l.c.

Hab.: Still water, Victoria Park, *W. J. Byram*. Also in Ireland, Sweden, and the United States of America.

P. ovum, *Nordst.* Sylloge Algarum, De Toni. (*Docidium ovatum*, Nordst. Desm. Brasil, p 205, tab. 3, f. 37.) Frond very stout, 320-400=115·125, oblong-lanceolate points 32 μ broad, middle constriction narrow, 76-81 μ broad; margin a little prominent; semi-cells ovate, apices truncate, crowned by 6 obtuse (or from a vertical view 10-12), membrane punctate, colourless.

Fig. 39 bis.: Copied from Otto Nordst., l.c.

Hab.: Still water, Victoria Park, Brisbane, *W. J. Byram*. Also in New Zealand, South Africa, Brazil, and South America.

PLEUROTÆNIOPSIS, Lund.

De Toni's general description is as follows:—"Cells shortly cylindrical or globose, more or less deeply constricted in the middle, and then divided into two semi-cells, as if composed of two *Cosmaria*, rounded at the apices or truncate; chromatophores parietal, running longitudinally, fasciculate in shape and irregularly lobed at the margin, furnished with many pyrenoids. Propagation by vegetative binary subdivision of the cells. Reproduction by zygotes."

P. turgida, (*Bréb.*) *Lund.* (*Calocylindrus turgidus*, Kirch., in Cooke's Brit. Desm., 127.) Frond very large, in front view oval, turgid rather more than twice as long as broad; constriction a shallow sinus; segments somewhat tapering, broadly rounded; end view circular; empty frond punctate. Size: Length, 187-216 μ; diam., 72·82 μ (D.); diam., 100 μ (K.).

Professor Moebius says:—"The cells are elliptical, slightly constricted in the middle, truncate at the ends, circular when seen from above; the membrane is finely punctate; form of the chromatophores indistinct, yet four pyrenoids are to be distinguished in each semi-cell. Diameter at the isthmus, 40-50 μ; length of the cells, 70-80 μ. These dimensions are somewhat less than those laid down. *Pl. pseudoconnata*, Lagh., likewise with four pyrenoids in each semi-cell, resembles it, but is shorter in proportion and of smaller dimensions. *Disphinctium* (*Cosmarium*) *subglobosum* (Nordst.). De Toni has the same cell-form, but only one pyrenoid in each semi-cell, and smaller dimensions.

Fig. 39: *a*, living frond; *b*, empty frond; *c*, end view.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft*. Victoria Park, Brisbane; and Townsville, *W. J. Byram*. Also found in Europe, Japan, and New Zealand.

P. tessellata, (*Delp.*) *De Toni*; **var. Nordstedtii,** *Moebius* (n. var.). Prof. Moebius continues:—"The specimens upon which I founded this new variety differ from the typical species (*Disphinctium tessellatum*, Delp. specim., Desm. subalp., p. 232, pl. 21, fig. 10-13), particularly in the more considerable central constriction. In consequence of this, the semi-cells appeared almost spherical with flattened poles. The membrane forms prominences in the shape of well-defined papillæ abutting on each other; these appear arranged

in longitudinal and transverse rows; in the middle of the semi-cells about 18 longitudinal rows, and in each semi-cell about 13 transverse rows, can be distinguished. At the isthmus the membrane is smooth. The endochrome was not clearly distinguishable, yet the chromatophores seem to be parietal, and each to contain two (or four) pyrenoids (Fig. 40). The greatest breadth of the cells amounts to 60-65 μ; those of the isthmus, 40-45 μ; the length, 110-118 μ.

"*Pl. tessellata* has been found by Delponte in Italy, and by Nordstedt upon *Utricularia* from Java. The latter author, to whom I submitted a preparation of the Australian alga, was so kind as to draw my attention to its relationship to the species named and the difference from this, on which account I take the liberty of naming the variety after him."

Hab.: Burpengary, *Thos. L. Bancroft.*

Prof. Moebius then adds the following Latin description:—"Var. a forma typica isthmo augustiore diversa, ita ut semi-cellulæ subglobosæ, apice et basi applanatæ appareant; cellulis 110-118 μ longis, 60-65 μ crassis, isthmo 40-45 μ crasso. Hab. in aqua dulci Australiæ (Burpengary)." (Variation from the typical form, differing in the narrower isthmus, so that the semi-cells appear subglobose, flattened at the apex and base; cells 110-118 μ long, 60-65 μ thick; isthmus 40-45 μ thick.)

Hab.: In freshwater, Australia, Burpengary.

COSMARIUM, Corda.

Frond more or less constricted; segments undivided, usually rounded, sometimes slightly sinuated, or rarely slightly contracted, somewhat extended and truncate at the ends, never notched, neither provided with spines nor processes; end view elliptic, and sometimes each side with a lateral opposite inflation, or circular.—Cooke's British Desmids, 79.

C. Seelyanum, *Wolle.* Prof. Moebius says:—"The examples found agree very well with the diagnosis and delineation in Wolle Desm. U.S., p. 73, Pl. XVIII., Fig. 33-35. Seen from above, the cells approach to quadrate; on each side of the half-cell are found two large, on the back four small, protuberances; the middle prominence is surrounded by a ring of small papillæ; at the periphery the puncta are arranged in two semi-circles; seen from above, the cells are elongated and cylindrical, with a central bulging on both sides; seen from the side, the cells appear biscuit-shaped. Length of the cells 26 μ, breadth at the constriction 22 μ, breadth of the isthmus 5 μ. Hitherto only known in North America."

Hab.: Waterhole, Victoria Park, Brisbane, *Thos. L. Bancroft.* Also in North America.

C. Meneghinii, *Bréb.* Cooke's British Desmids, 93. Frond very minute, rather longer than broad; constriction linear; segments subquadrate, bicrenate at the sides and ends; smooth, end view elliptic. Size: Length, 18 μ; diam., 14 μ (D.); length, 24-34 μ; diam., 20-22 μ (K.); diam., 20-22 μ (W.).

C. M. forma ? "The specimens observed differ from the typical form in the eight-cornered outline of the semi-cells. The margin consequently exhibits not four but six sinus; in other respects the

form and size of the cells seem to me to agree best with this species. (Fig. 41 : *a* from the front, *b* from above, *c* from the side.) Breadth 18-21 μ, isthmus scarcely a third as broad, length 26-28 μ. In each semi-cell is a chromatophore with a well-defined pyrenoid. The form also recalls to mind *C. granatum*, Bréb., var. *subgranata*, Nordst. (Alg. Sandvic., p. 13, Pl. II., Fig. 8), which has a similar crenate outline and similar dimensions, but in this case the sides of the base proceed in the first place away from each other, and then converge more considerably than is the case in *C. Meneghinii*. This species occurs in different varieties very widely distributed, but I do not find that it has hitherto been attributed to Australia."—Moebius.

Hab.: Waterhole, Victoria Park, *Thos. L. Bancroft*.

C. obsoletum, (*Hantzsch*) *Reinsch*. Prof. Moebius gives the following note :—"Seen from above, almost circular ; distinguished by the short spines at each of the four corners contiguous to the constriction. My dimensions are intermediate between those given by De Toni (Sylloge, p. 974) and Nordstedt (Alg. Mus. Lugdun., Batav., p. 7) : length 52 μ, breadth 56 μ, breadth of the isthmus 26 μ. The specimens were very isolated."

De Toni's description, to which Prof. Moebius alludes with regard to the dimensions, is as follows :—"Cells regularly elliptical, 39-42= 48-52, 21-24 μ thick, the isthmus 20 μ broad ; semi-cells flattened hemispheres, with a sinus extending outwards after the manner of the Greek letter gamma (γ), the lower corners suddenly pointed into a short spine ; apex plano-convex ; two pyrenoids in each semi-cell ; membrane finely punctate ; cells seen from above, elliptical ; from the side almost circular (whole cell somewhat biscuit-shaped.)"

Hab.: Burpengary, *Thos. L Bancroft*. Also in Europe, Burma, and Java.

C. reniforme, *Archer*. Cooke's British Desmids, 104. Segments reniform, in end view equally elliptic. Zygospore globose, armed with long spines, which are cleft at the summit. Size: Length, 50 μ ; diam., 50 μ.

C. reniforme, var. compressum, *Nordst*. New Zealand Freshwater Algæ, 46.

Fig. 42 : From Otto Nordstedt's New Zealand Freshwater Algæ.

Prof. Moebius observes :—"Found in numerous examples, which were often enclosed in a brown mass. The var. *compressa* differs in the aspect of the cells from above, by which they appear elongate-elliptical with almost parallel sides longitudinally, and in the arrangement of the puncta upon the membrane in longitudinal and oblique rows (quincunx). These characteristics tally also with the foregoing form. Cells 56-62 μ long, 50-52 μ broad, isthmus 16 μ broad. The var. *compressa* is known in New Zealand ; the typical form in Europe, North and South America."

Hab.: Waterholes, Victoria Park, *Thos. L. Bancroft*. Also in New Zealand.

C. subpunctulatum, *Nordst*. New Zealand Freshwater Algæ, 47. Prof. Moebius says :—"The examples found correspond to the delineation and description given by Nordstedt (New Zeal. Alg., p. 47, Pl. V., Fig. 8). Length and breadth of the cells about 30 μ ; isthmus, 10-12 μ broad. Hitherto only known in New Zealand."

Fig. 43 : From Otto Nordstedt's New Zealand Freshwater Algæ.

Hab.: Burpengary, *Thos. L. Bancroft*. Also in New Zealand.

MICRASTERIAS, Ag.

Frond mostly lenticular, as long as or slightly longer than broad, deeply constricted into two-lobed segments; segments usually semi-orbicular, five or sometimes three-lobed; lobes incised or divided, mostly radiant, their ultimate subdivisions spreading, dentate or minutely spined, or rarely only sinuate at the outer margin; central constriction usually linear.—Cooke's British Desmids.

M. denticulata, *Bréb.* Cooke's British Desmids. Frond orbicular, smooth; segments, five-lobed; basal and middle lobes twice dichotomous, ultimate subdivision truncato-emarginate with rounded angles; end lobe simply thrice emarginate; zygospore orbicular, beset with scattered, stout, elongate spines, at first simple and obtuse, afterwards forked or trifid, their divisions finally again branched and recurved. Size: Length, 250 μ; zygospore, 80 μ (K.); length, 218 μ; diam., 182 μ (R.).—Cooke, l.c.

The multiplication of this desmid by subdivision is an interesting process which, with the exercise of a little patience, may be observed in its different stages. The two semi-cells first slightly separate at the sutural line, and at the same time a small hyaline hemisphere is put forth from each half-cell, and gradually enlarges by the flowing-in of the endochrome. As this enlargement progresses, the semi-cells further recede from each other, and each of the hyaline hemispheres undergoes progressive subdivision at its edges—first into three lobes, then into five, then into seven, then into thirteen—and finally, at the time of separation, acquires the characteristic notched outline of its type, and is only distinguishable from the older half by its smaller size.

Fig. 43 bis.: *a*, living frond; *b*, empty frond; *c*, zygospore.—Cooke, l.c.

Hab.: Still water, Victoria Park, *W. J. Byram.* Also widely distributed in England, Wales, Scotland, France, Germany, Sweden, Norway, Denmark, Italy, and the United States of America.

EUASTRUM, Ehr.

Frond longer than broad, compressed; deeply constricted into two-lobed or sinuated segments; segment usually pyramidal, five or three-lobed or merely sinuous, possessing variously disposed circular inflated protuberances (rarely absent); lateral lobes opposite, very rarely radiant, rounded or sinuated at extremities; end lobes acutely incised or emarginate at the centre, rarely only concave; central constriction linear.—Cooke's British Desmids, 63.

E. cuneatum, *Jenner.* Cooke's British Desmids, 70. Frond large, rather more than twice as long as broad, segments pyramidal, broadest at the base and narrowing upwards, not lobed, the sides almost straight; ends truncate, central notch linear. Empty frond without inflations. Size: Length, 118 μ; diam., 55 μ (R.); length, 96-100 μ; diam., 47-50 μ (L.); length, 92-117 μ; diam., 45-62 μ (K.).—Cooke, l.c.

Note of Prof. Moebius:—"In numerous examples of varying size: length, 96-150 μ; breadth, 42-64 μ; isthmus, 11-18 μ broad. The length thus amounts to a little more than double the breadth, whilst in those found by Nordstedt in Australia and New Zealand—var. *sola*—

the cells are three times as long as broad. Moreover, this var. seen from above shows only one prominence, whilst the typical form is furnished with four of them."

Fig. 44: *a*, living frond; *b*, empty frond; *c*, end view—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft*. Also found in Europe.

E. sinuosum, (*Lenor*) *Ralfs*. Cooke's British Desmids. Frond about twice as long as broad; segments three-lobed, basal portion emarginate at the sides; end lobe somewhat dilated, its notch linear. Empty frond punctate; semi-cells in front view with five basal inflations, and two others at the extremity; transverse view, with three inflations at each side, and one at each end. Size: Length, 76 μ; diam., 45 μ (R.).—Cooke, l.c.

Fig. 44 bis.: *a*, *c*, living fronds; *b*, *d*, empty fronds; *e*, end view.—Cooke, l.c.

Hab.: Still water, Victoria Park, *W. J. Byram*. European Habitats: Westmoreland, Hants, Wales, France, Sweden, Norway, and Denmark.

E. ansatum, (*Ehr.*) *Ralfs*. Cooke's British Desmids, 70. Frond about twice as long as broad; segments inflated at the base, tapering upwards without sinuations into a neck, and not dilated; rounded, its notch linear. Empty frond punctate, turgid in the middle. Size: Diam., 25-36 μ (W.); length, 76 μ; diam., 38 μ (R.); length, 75-88 μ; diam., 37-41 μ (K.); length, 86 μ; diam., 43 μ (D.).—Cooke, l.c.

Prof. Moebius says:—"The examples were, in comparison with those of the foregoing species, of almost equal size: 61-70 μ long, 34-40 μ broad, isthmus 10-14 μ broad. The sides are arched before the end lobes somewhat more strongly than in the typical form, whereby the foregoing rather resembles the var. *supraposita*, Nordst.; yet I have not been able to observe three prominences upon the surface of each half-cell. The membrane is finely punctate."

Fig. 45.: *a*, living frond; *b*, *c*, empty fronds; *d*, side view; *e*, end view.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft*. Also found in Europe, North America, Greenland, Siberia, Burma, Brazil, Japan, and New Zealand; consequently very generally distributed.

E. binale, (*Turp.*) *Ralfs*. Cooke's British Desmids, 75. Frond very minute, scarcely twice as long as broad, oblong; segments with their basal portion either entire or bicrenate at the sides, slightly contracted beneath the ends; ends dilated, not protuberant beyond the angles; its central notch acute, broad; transverse views with two lateral inflations, ends truncate, angles rounded. Size: Diam., 15-25 μ (W.); diam., 24 μ (D.).—Cooke, l.c.

Prof. Moebius remarks:—"The Australian form completely corresponds with Fig. 8, tab. xiv., Ralfs' Brit. Desm., which illustrates the var. β. Ralfs. The ends have a rectilineal incision, and are divided into tolerably sharp angles. On each of the upper corners is a larger spine; on each of the sides are two smaller spines, beneath each superior incision is formed a well-defined projection, which also is visible when viewed from above. The cells are 24 μ long, 20 μ broad; the isthmus is 4 μ broad. Of this species, allied to *E. elegans*, numerous varieties are assigned, amongst which, however, var. β. Ralfs is not to be found in De Toni's Sylloge (p. 1084)."

Fig. 46: *a*, *c*, *e*, living fronds; *b*, *d*, *f*, empty fronds.

Hab.: Burpengary, *Thos. L. Bancroft*. Ponds, Thompson Estate, Brisbane, *W. J. Byram*. Very generally distributed—Europe, Jamaica, North America, Brazil, Burma, Siberia, Hawaii, and Africa.

STAURASTRUM, Meyen.

Frond more or less deeply constricted at the middle; segments broader than long, often provided with spines or processes; end view angular or radiate, or circular with a lobed radiate margin, or very rarely compressed with a process at each extremity.—Cooke's British Desmids, 138.

S. dejectum, *Bréb.* Cooke's British Desmids, 138. Segments smooth, lunate, or elliptic; constricted portion very short, awns projecting upwards; end view with three or four inflated awned lobes. Zygospore orbicular, spinous; spines at first hair-like, afterwards stout and subulate. Size: 25 μ (W.); length, 24-28 μ; diam., 19-33 μ (K.); diam., 25-38 μ; without spines (Wo.).—Cooke, l.c.

Prof. Moebius' note is as follows:—"Seen in a few examples; from above triangular with rounded angles and contracted sides (length of the side, 35 μ.) Awns turned outwards, as in the var. *patens*, Nordst.; the reverse sides not convex, as in this case, but slightly concave, as is the case in many forms."

Fig. 47: *a*, living frond; *b*, empty frond; *c*, variety; *d*, *e*, *f*, end views; *g*, zygospore.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft.* Found also in Europe and North America.

S. pseudosebaldii (*Wille*), **var. bicornis,** *Boldt.* Prof. Moebius gives the following observations:—"In isolated examples, which are distinguished by the fact that the semi-cells have only two prolongations, and every prolongation is extended at the end into two awns. Nordstedt's subsp. *tonsa* from New Zealand and Australia has indeed only two prolongations, but at the end of each one three awns. (In the var. *bicornis*, Boldt, nothing is mentioned as to the number of these awns.) Moreover, the structure of the membrane (with two rows of furcate spines on the back) and the size of the cells tally better with var. *bicornis* than with subsp. *tonsa*, Nordst. Length of the cells, 24-30 μ; breadth, 48-56 μ; of the isthmus, 8 μ. The typical form is known in Europe and North America, var. *bicornis* in Siberia."

Hab.: Burpengary, *Thos. L. Bancroft.* Also in Europe and N. America.

S. sagittarium, *Nordst.* Freshwater Algæ of New Zealand and Australia, 37. Prof. Moebius says:—"Only one-half cell seen, the structure of which is somewhat irregular, and which I consequently figure (Fig. 48). This figure differs from Nordstedt's (New Zealand Algæ, Pl. IV., Fig. 6) in the fact that it is not eight but six-rayed, that the rays terminate not in three but four points, and that the puncta upon the dorsal surface are not single but double. The inner circle with which the semi-cells come into mutual contact is surrounded with a wreath of awns, alternately greater and less, extending outwards (the pointed lines in the figure). Diameter of the cell with the rays, 65-5 μ (according to Nordstedt, 50-62 μ). *S. sagittarium* has hitherto only been known in New Zealand."

Hab.: Burpengary, *Thos. L. Bancroft.* Enoggera, *W. J. Byram.* Also in New Zealand.

Class III. PHYCOCHROMOPHYCEÆ, Rabh.

Sub-class HETEROCYSTEÆ.

Order V. HORMOGONEÆ, Thur.

Family IX. SIROSIPHONIACEÆ, Rabh.

Most, if not all, the genera of this family are included in the order Lichenes by some botanists, while others include them in the order Algæ. Dr. Cooke, in his British Freshwater Algæ, gives the few British species in the form of an appendix, for the convenience of students. As, however, Professor Otto Nordstedt includes them in his Freshwater Algæ of New Zealand and Australia, and Professor Moebius, in his paper on the Queensland Algæ does the same, I have thought it advisable to follow the latter, and record them in the present Bulletin.

HAPALOSIPHON, Nægeli.

Trichomes formed mostly of a single row of cells, sheath slender, aquatic plants, looking like *Tolypothrix*.—Cooke's British Freshwater Algæ, 274.

H. pumilus, (*Kuetz.*) *Kirchn.* Prof. Moebius' note is as follows:—"Thallus in minute flaky or turfy masses amongst other algæ. The creeping threads are with sheath 7 μ, the cells 5 μ thick, once or twice as long or even shorter than the diameter. The numerous threads rising erect are to some small extent thinner; the cells, however, in this case are, as a general rule, longer (2-4 times as long as thick); the end cell, rounded above, is somewhat turgid. The heterocysts, which are only found in the recumbent threads, are oblong, 2-4 times as long as broad, not thicker than the vegetative cells. The dimensions, which are specified by Bornet and Flahault (Revision des Nostocacées heterocystées, II., p. 61), are appreciably larger; yet mine agree tolerably well with those of Nordstedt, given for a form found in the Sandwich Islands, for which reason I am not in a position to set this alga down as a special form. For the same species from Australia and New Zealand, Nordstedt has not specified any dimensions. The species is widely distributed, and occurs, in addition to the localities indicated, in Europe, North America, Brazil, and the East Indies."

Hab.: Burpengary, *Thos. L. Bancroft.* Also in Europe, North America, Brazil, and the East Indies.

STIGONEMA, Ag.

Cells of the trichome often geminate or ternate in consequence of their lateral multiplication, or even forming transverse, several-celled bands; sheath large; cells surrounded with a thick membrane, very prominent in the old filaments; hormogones originating in ateral branchlets formed of a single row of cells.—Cooke's British Freshwater Algæ, 270.

S. hormoides, *(Kuetz.) Born. et Flah.* Prof. Moebius observes:—"Found scattered in the slime of the *Coleochæte Baileyi* (supra), corresponding to the statements of Born. and Flah. (*ibid.*, p. 69) that the alga occurs abundantly in the slimy masses of other algæ; in this situation it lives in the water, besides which it is to be

met with on damp rocks. Threads with sheath 7-9 μ thick, sheath colourless, stratified; cells 4-5 μ thick, once or twice as long, elliptical; threads also themselves lengthwise, somewhat twisted. The cells lie mostly in single rows, here and there in pairs; between the cells are to be seen well-defined plasmic connections. The appearance corresponds with the representation in Kuetzing (Tab. phyc. II. t. 34, Fig. 4); the figure (*see* Fig. 49) given beneath represents a larger piece of the alga."

Hab.: Burpengary, *Thos. L. Bancroft*. Also in Europe, North America, and New Zealand.

COPROSIRA, *Kuetzing*.

C. Brebissonii, *Kuetz.* Prof. Moebius says:—"This remarkable alga deserves special notice, as well on account of its striking appearance as on account of its rare occurrence. According to Born. and Flah. (Ub. Sup., p. 80) it was first found by Brébisson in France, then by Rabenhorst in Germany, and almost forty years afterwards by Nordstedt in Sweden. This author has brought it under notice by his diagnosis in the 'Algæ Exsiccatæ' (Nv. 183). The representations which Kuetzing (Tab. phyc. II., t. 84) (after him Rabenhorst) gives are in all respects unsatisfactory; but good representations, showing details, are to be found in Borzi (N. Giornale botanico Italiano, XI., Tab. XII., Fig. 33-38). I found it on the twig to which also the *Batrachospermum vagum* was adherent. Here it forms almost hemispherical solid cushions of almost 1 mm. diameter and 0·25-0·5 mm. in height, and of yellowish colour (in alcohol). In the vertical section it is seen that the thallus consists of threads, parallel in the middle, ascending radiately at the margin, which proceed from creeping threads, irregularly branched, and are connected with each other sideways. The ends are free, and approximately of the same height (*see* Fig. 49, bis. *a*). It is asserted that in the section concentric zones (perhaps zones of annual growth) of yellow and green colour have been observed; yet in this instance this was not the case. Very likely the plant was as yet too young, for the cushions were as much as 3 mm. high. Perhaps, too, at all events, the existence of a difference of colours has been obliterated by the alcohol. An interruption of the growth has evidently not yet taken place, since the threads can be traced from beneath even to the upper margin.

"The cells are roundish, 4-5 μ thick, for the most part shorter than broad, yet also occur longer (as much as double as long as broad); the terminal cells on the free ends of the threads are especially distinguished by their length (4 μ broad, as much as 9 μ long). (*See* Fig. 49, bis. *b*.) The plasmic connection between the cells, as in many Sirosiphoniaceæ, is very well defined. The heterocysts originate from the vegetative cells—from the longitudinal subdivision of them; they consequently lie sideways, are of elliptical form, somewhat smaller than the vegetative cells, and are distinguished by the shining membrane (*see* Fig. 49, bis. *b. h*). They stand clearly out after the application of reagents has caused them to swell; without these they are collected together and appear only as small shining corpuscles. The sheaths are colourless, 7-8 μ broad, homogeneous, and united to each other almost without interstices; above the terminal cell they are very much thinned away."

Family X. SCYTONEMACEÆ, Rabh.

Filaments with lateral ramifications, in which some of the cells change into heterocysts.—Cooke's British Freshwater Algæ, 264.

This family is divisible into two sections, according to the direction of the multiplication of the cells.—Cooke, l.c.

SCYTONEMA, Ag.

Sheath enclosing a single trichome, ramifications produced by the deviation of the trichome, which emerges from the side of the sheath. Ramifications usually geminate, produced by a fold of the trichome which ruptures outside of the sheath, and gives origin to two filaments given off at a right angle. Heterocysts scattered here and there in the trichome, without any evident relation to the ramifications.—Cooke's British Freshwater Algæ, 264.

S. subtile, *Moebius* (n. sp.). This alga is set down by Prof. Moebius as a new species. He remarks:—"This alga, which seems to me not to agree with any of the described species, belongs to the section *Euscytonema*, Born. et. Flah., and forms no coherent layer, but occurs in isolated threads amongst other algæ in water. (Fig. 50: *a*, fragment of a filament with branching; *b*, end of a branch.) The threads are with the sheath 12-17 μ thick, the sheath colourless and stratified; the cells are only 2-4 μ thick, twice to three times as long, and cylindrical only; the cells adjacent to the terminal cell are short and disc-shaped. In the endochrome several vacuoles are generally to be observed, and on many cells in the centre a dark body (nucleus?). The heterocysts are oblong, 4 μ thick, 10-14 μ long. Spores were not seen. The branchlets originate in pairs, and at the point where they are given off are perceptibly thinner, but as they proceed are only slightly thinner than the main threads."

Hab.: Burpengary, *Thos. L. Bancroft.*

Prof. Moebius adds a Latin description of this new species, which I append:—"Species sectionis Euscytonematis, Born. et Flah., filis sparsis longis, ramos binos basi connatos ramis primariis vix tenuiores emittentibus, cellulis 2-4 μ crassis, cylindricis, cellulæ terminali proximis disciformibus, ceteris diametro 2-3 plo. longioribus, vagina hyalina, lamellosa, 12-17 μ crassa, heterocystis 4 μ crassis, 10-14 μ longis, sporis non visis. Hab. inter alias algas aquæ dulcis Australiæ (Burpengary)." (Species belonging to the section *Euscytonema*, Born. et Flah. Threads long and scattered, each giving off two branchlets connate at the base, scarcely thinner than the main branches. Cells 2-4 μ thick, cylindrical, those nearest to the terminal cell being disc-shaped, and the others 2-3 times longer than the diameter; sheath hyaline, lamellose, 12-17 μ thick, heterocysts 4 μ thick, 10-14 μ long. Spores not seen."

Hab.: Amongst other freshwater algæ of Australia (Burpengary).

Family XI. NOSTOCEÆ, Kuetz.

Trichomes furnished with heterocysts, involved in a very copious gelatin, more or less firm or diffluent, which is collected into a variously expanded or very often indefinite thallus, or rarely with the mucilage quickly dissolved, sub-solitary.—*Borzi Alg. Fico;* Cooke's British Freshwater Algæ, 224.

NOSTOC, Vauch.

Thallus gelatinous or membranaceous, girt by a more or less firm periderm, definite, globose, or variously expanded. Trichomes flexuously curved, irregularly interlaced, now and then vaginate, joints globose or elliptical, distinct, or more or less closely connected. Heterocysts terminal or intercalated, larger or equal to the other cells. Spores equal to the heterocysts, or a little larger, green, becoming bluish, olivaceous, or yellowish-brown.—Cooke, l.c.

The *Nostocs* consist of a more or less firm jelly, in which beaded filaments are embedded, consisting of chains of small, somewhat globose, simple cells. These filaments or *trichomes*, are usually surrounded by a sheath, which is often so delicate as scarcely to be visible, or it is almost obsolete. The frond or thallus may be globose, discoid, lobed, or irregular with a more or less distinct outer layer forming a kind of epidermis. At irregular distances in the trichomes are larger cells, or *heterocysts*, formerly regarded as spermatia, which differ in colour from the other cells of the trichome. Individual cells become heterocysts uninfluenced by any definite law at present demonstrated. Increase in the filaments is caused by division of the cells in the longitudinal direction, whereby the trichome is constantly being lengthened and new cells added, which lie in the mucilage. Thuret has explained the process by which new plants originate from fragments of the trichome, which he terms *hormogones*. The mucilage of old plants being softened, portions of the threads which lie between the heterocysts are detached and escape from the mucilage, whilst the heterocysts remains behind. These escaped fragments become endowed with motion, similar to that observed in *Oscillaria*. The cells of the hormogone increase by division at right angles to the filament, and ultimately separate longitudinally, becoming the centres of new plants. Besides the reproduction by hormogones, certain special cells of the trichome enlarge and become converted into spores, which germinate and produce new plants; but no evidence of sexual reproduction has yet been adduced.—Cooke's British Freshwater Algæ, 224.

N. paludosum, *Kuetz.?* The following is the note of Prof. Moebius:—"Small, 100-200 μ; large layers amongst other algæ; cells, 3-4·5 μ in size; heterocysts somewhat larger (6-7 μ). Spores are not present, on which account especially the determination is not certain."

Hab.: Burpengary, *Thos. L. Bancroft.*

N. cæruleum, *Lingb.* Cooke's British Freshwater Algæ. Frouds small, globose or subglobose ($\frac{1}{2}$ to 4 lines), fixed or free swimming, usually gregarious, blue or greenish-blue. Trichomes dissimilar, unequal; joints of two forms, the one (young) elongated, the other larger, nearly spherical, sometimes filled with opaque granules. Size: Joints, ·004-·007 mm.; heterocysts, mm.

Fig. 50 *bis.*: *a*, plant natural size; *b*, trichomes x 400; *c*, portion of trichome x 600.—Cooke, l.c.

Hab.: Still water, Victoria Park, *W. J. Byram.* Common in Europe.

Family XII.—OSCILLARIACEÆ, Stiz. et Rabh.

Lyngbyæ, in Cooke's British Freshwater Algæ, with the following description:—"Filaments without heterocysts, and destitute of a terminal hyaline hair, single and scattered, or numbers associated in bundles and enclosed in a common sheath, often radiating. Joints shortly cylindrical, disc-shaped in section."

LYNGBYA, Ag. em Thuret.

Filaments enclosed singly in a sheath, simple, or only exceptionally exhibiting the beginning of ramification where the trichome issues from the side of the sheath; often combined in a membranaceous stratum.

L. solitaris, *Kirchn.* Prof. Moebius gives the following note:—"Threads with sheath 8-9 μ thick, sheaths thin, joints clearly defined, 3-4 times shorter than the diameter; end-cell single, rounded. I am not aware whether this alga has also been found out of Europe."

Hab: Nines Waterhole, Myrtle, *Thos. L. Bancroft.*

L. obscura, *Kuetz.* "Threads with sheath as much as 24 μ thick, sheaths thick and stratified; cells 14-15 μ thick, 4-6 times shorter. Known in Europe and North America."—Moebius.

Hab.: In waterholes, Victoria Park, *Thos. L. Bancroft.*

OSCILLARIA, Bosc.

Trichomes simple, usually distinctly articulate, rigid, straight, or a little curved, rarely circinate or spirally convolute, for the most part brightly coloured (blue-green, steel-blue, violet, æruginous, &c.), motile, nestling in a matrical mucilage; joints disc-shaped in the front view, without a sheath distinct from the trichome.—Cooke's British Freshwater Algæ, 246.

The species are at present distinguished by very artificial characters, which are by no means permanent.—Cooke, l.c.

O. leptotricha, *Kuetz.* Cooke's British Freshwater Algæ, 247. Solitary, scattered, or clustered in a very thin blue-green stratum, trichomes very slender, slightly curved, indistinctly articulate; joints twice as long as broad, or after division equal, very minutely punctate at the periphery, attenuated at the ends, which are straight, curved, or deflexed; cell-contents pale blue, green, homogeneous or finely granular. Size: Threads, ·003mm. diam.—Cooke, l.c.

Prof. Moebius gives the following note:—"Recognisable by its long-pointed sometimes curved ends and the joints, which are 1·5-3 times as long as thick. Threads 3 μ thick, points thinned away to as much as 1·5 μ. The threads are sometimes twisted, and the twisted portions wound round each other. (Fig. 51.)"

Hab.: In waterholes, Victoria Park, *Thos. L. Bancroft.* Also in Europe.

O. tenuis, (*Ag.*) *Kirchn.* (?). Forming a bright green or dark blue-green stratum, shortly, or elongated radiating; trichomes straight, rather rigid, more or less endowed with active motion; joints equal or half as long as broad, sometimes a little constricted at the dissepiments, which are delicately granulated; apex more or less attenuated, obtuse, curved or straight; cell-contents pale watery blue. Size: Threads, 0·054-006 mm. diam.—Cooke's Freshwater Algæ.

Prof. Moebius says:—"The *Oscillaria* forms contained in the various collections very much resembled each other, and may, according to the thickness of the threads (4-5 μ) and the shortness of the joints, belong to the kindred group of *O. tenuis*, which is known in Europe and North America. Probably, however, it is universally distributed."

Fig. 52: Portions of trichomes x 400.—Cooke, l.c.

Hab.: Victoria Park, Burpengary, *Thos. L. Bancroft*. Also in Europe.

Order VI. COCCOGONEÆ, Thur.

Family XII.—CHROOCOCCACEÆ, Næg.

Thallus mucous or gelatinous, amorphous, enclosing cells and families irregularly disposed.—Cooke's British Freshwater Algæ, 203.

SYNECHOCOCCUS, Næg.

Cells oblong, usually single, sometimes 2-4, connected in a series constituting a family. Cell-membrane thin; cell-contents blue-green, now and then yellow or pale orange. Tegument absent. Division in one direction only.—Cooke's British Frestwater Algæ, 217.

S. æruginosus, *Næg.* Prof. Moebius' note is as follows:—"Cells generally in pairs, more rarely single or arranged in groups of several, ca. 9 μ thick, 15-18 μ long."

Hab.: Nines Waterhole, Myrtle, *Thos. L. Bancroft*. Also in Europe and North America.

MERISMOPEDIUM, Meyen.

Cells globose, at the time of division oblong, rather thick, teguments confluent; 4-8-16-32-64-128 associated in tubular families of a single stratum, forming a quadrate, plane, free-swimming thallus.—Cooke's British Freshwater Algæ, 214.

Gœbel has observed the formation of zoospores in this genus.—Cooke, l.c.

M. glaucum, *Næg.* Cooke's British Freshwater Algæ, 214. Thallus more or less limited, glaucous green, margin slightly sinuately crenate, families composed of 16-48-64 (rarely more) oval or globose cells; cell-contents pale blue-green. Size: Cells, ·003-·005 mm.; families, ·04-·05 mm.—Cooke, l.c.

Prof. Moebius gives the following note:—"Cellus 3 μ thick; families generally consisting of 64 cells. Seems to occur universally. I find it attributed to Europe, North America, Brazil, Hawaii, and New Zealand."

Fig. 53: Families magnified 400 diam.—Cooke, l.c.

Hab.: Burpengary, *Thos. L. Bancroft*.

CLATHROCYSTIS, Henfrey.

Frond, a microscopic gelatinous body, at first solid, then saccate, ultimately clathrate (fragments of the broken fronds occurring in irregularly-lobed forms), composed of a colourless matrix, in which are embedded innumerable minute cells, which multiply by division within the frond as it increases in size.—*Quart. Journ. Micr. Soc.*, 1856; Cooke's British Freshwater Algæ, 212.

C. æruginosa, *Henf.* Cooke's British Freshwater Algæ, 212. Frond floating in vast strata on freshwater pools, forming a bright-green scum, presenting to the naked eye a finely granular appearance; when dried, appearing like a crust of verdigris; cells minute. Size: Fronds, ·03-·13 mm.; cells, ·0025-·0035 mm.—Cooke, l.c.

"The smallest fronds met with are usually roundish or ellipsoidal. When quite young they appear to be solid, but, as they grow by the multiplication of the internal cells and the secretion of gelatinous matter, the expansion takes place chiefly near the periphery, so that the frond becomes a hollow body. The walls of the sac then give way, and, as the expansion proceeds, orifices are formed in different parts, until the whole becomes a coarsely-latticed sac or clumsy net of irregularly-lobed form. Then this becomes broken up into irregular fragments of all shapes and sizes (giving the stratum a granluar appearance to the naked eye), each of which recommences the expanding growth and becomes a latticed frond. The internal cells are very minute, but have a distinct margin with internal granules. They multiply by dividing into two and four. The gelatinous frond always presents a transparent border or peripheral stratum, destitute of green cells; but no boundary membrane exists, the surface exhibiting a softened or half-dissolved aspect. On the approach of winter the fronds ceased to increase, and by degrees most of the gelatinous masses faded to a light-brownish tint, swelled up, and settled to the bottom of the water in light flocculent clouds. They appear to become half-dissolved, and to allow the green cells to become free, as many of the latter were found free, adhering to the sides of the vessel. Perhaps these reproduce the fronds in the next season. No zoospores were ever detected."—*Henfrey;* Cooke, l.c.

Prof. Moebius says:—"The material consisted only of peridinia and of this alga. Its globular cells are 3-4 μ thick; the families of very many forms at first globular, then sausage-shaped or broken up into numerous fragments. The breaking up commences by the small globular families (with a diameter of about 150 μ) showing in the centre a sac of free cells. The largest colonies observed measured 700 μ in the longest diameter; according to Kirchner, the families ought, however, only to be 30-130 μ in size."

Fig. 54: *a*, thalli magnified 200 diam.; *b*, cells magnified 400 diam.—Cooke, l.c.

Hab.: Enoggera Creek, brought by the pipes from the dam, *Thos. L. Bancroft* Also found in Europe and North America.

Prof. Moebius concludes by saying:—"Subsequently I received through Dr. Nordstedt a dried specimen of a *Compsopogon*, which was collected by Mr. Bailey in Queensland. In the dry condition its colour is throughout a clear violet, but in the branching, the dimentions, and the structure the plant so far agrees with *Compsopogon coeruleus*, Montg., that I have no hesitation in classing it with this species. Here again, also, there was no trace of organs of fructification to be found. As far as structure is concerned, it corresponds in all respects to that of *C. chalybeus*, Kg., as I have figured it in the 'Hedwigia, 1888, part 9-10.' The rind on the younger branches consists of one layer; on the older from two to three layers. The outermost cells of the rind are here and there papillæ-form; they do not lie in such regular rows as Kützing indicates. In the oldest

portions of the stem the central cells must perish to a certain extent, and their septa be resorbed as follows, from the following observations:— Upon putting the dried plants into water, air-bubbles appeared in the inner portions, and these may be made to change their position to greater distances. Moreover, it is seen on a cross-section through these spots that the inner cells of the rind arch inwards, and have often repeatedly subdivided, so that they then fill up the interior cavity more or less. Upon the younger portions of the *Compsopogon* an epiphytic Cyanophycea was found in tolerable abundance, which formed minute disc-shaped, stratified, but generally somewhat arched cell-colonies. *C. cæruleus* is known in Africa and America."

GLOSSARY.

GLOSSARY, *in which will be found explained most of the scientific terms used in describing plants belonging to the cryptogamic orders.*

ACCESSORY—Something superadded to the usual condition of an organ.
ACETABULOUS—Shaped like a cup or saucer.
ACICULAR—Needle-shaped.
ACHROMATIC—Colourless.
ACROCARPI—Mosses having their fructification terminating the axis.
ACULEATE—Furnished with prickles.
ACUMINATE—Tapering to a point.
ADDUCTORES—The young state of the Thecæ of mosses. These being crowded together are mostly abortive, whilst one only is usually developed, at least, at the same spot.
ADNATE—Grown to or attached, lengthwise.
ÆRUGINOUS—Of the colour of verdigris.
AGAMO-HYPNOSPORES—Neutrally formed resting spores.
AGAMOSPORE—Spore formed neutrally without fecundation.
ALA—A wing.
ALATUS—Winged.
ALTERNATE—Two organs so placed as not to be opposite to each other.
ALVEOLATE—Studded with cavities; somewhat resembling the cells in a honeycomb.
AMORPHOUS—Without definite form.
AMPHIGASTRIUM—A stipular appendage, peculiar to certain Hepaticæ, which clasp and cover their stems.
ANASTOMOSE—Applied to veins or threads which become confluent, and form an irregular network.
ANDROGONIDIA—Peculiar zoogonidia produced by female plants, from which male plants are developed.
ANDROSPORANGIUM—Sporangium enclosing spores of male plants, or androspores.
ANDROSPORE—A special kind of zoospores produced in cells, which originate the dwarf males in Œdogonium.
ANNULUS—A ring. In the mushroom, the remains of the veil left upon the stem.
ANTHERIDIA—Certain reproductive organs, supposed to be analogous to anthers, or fecundative.
APEX—The summit.
APICULUS—Ending in a short point.
APOPHYSIS—A swelling at the base of the theca in some mosses.
APOTHECIUM—The rounded, shield-like fructification of lichens.
APPRESSED—Pressed close to.
ARACHNOID—Applied to fine hairs, so entangled as to resemble a cobweb.
ARCHEGONIUM—The young female organ in Cryptogamic plants.
ARCUATE—Bent like a bow, or arched.
AREOLA—An angular space with an elevated margin.
ARISTATE—Awned.
ARTHROSTERIGMATA—Short, straight, articulate sterigmata.
ARTICULATE—Composed of joints.
ASCUS—A bag. The cases which contain sporidia are so called.
AURICULATE—Having ear-like appendages.

BASIDIUM—A cell bearing on its exterior one or more spores in some fungi.
BILOBATE—Having two lobes.
BINATE—In pairs or couples.
BOTRYOID—Collected in clusters, supposed to resemble a bunch of grapes.
BULLATE—Blistered or puckered.
BYSSOID—Very slender, like a cobweb.

CÆSPITOSE—Growing in tufts; many stems from one root.
CALATHIFORM—Like a bowl or cup.
CALYPTRA—The outer covering of the sporangium of mosses.
CAPILLARY—Thread-like, resembling a hair.
CAPILLITIUM—Sterile thread-like tubes or fibres, often branched or combined in a net, interpenetrating the mass of spores within a ripe sporogenous body.
CARPOSPORE—Spores produced (by conjunction) in a sporo-carpium.
CARTILAGINOUS—Hard and tough, like cartilage.
CAULOID—Resembling or analogous to a stem.

CAULUS.—A stalk or stem.
CELLULOSE—The chemical substance of which the cell-wall is composed.
CHLOROPHYLL—The green colouring matter of leaves, and other green parts of plants.
CHLOROPHYLLOSE—Resembling the green matter of leaves.
CILIATE—Furnished with a fringe of hair, resembling an eyelash.
CIRCINATE—Curled round, like the young fronds of most ferns, crozier-like.
CIRCUMSCISSILE—Cut round transversely.
CLATHRATE—Latticed or perforated like a window.
CLAVATE—Club-shaped.
CŒNOBIUM—A community of a definite number of individuals united in one body.
COLUMELLA—The central column in the sporangia of mosses.
CONCENTRICALLY—In rings, with a common centre.
CONFLUENT—Running into each other.
CONJUGATION—The union of two cells, so as to develop a spore.
CORDATE—Heart-shaped.
CORIACEOUS—Of a leathery consistence.
CORTINA—That portion of the veil which adheres to the pileus of some agarics in fragments.
COSTA—The midrib of a simple leaf or frond.
CRENATE—Notched or scalloped
CRUSTACEOUS—Hard and brittle, or forming a crust.
CUPULA—Cup-shaped.
CUNEATE—Shaped like a wedge.
CUSPIDATE—Tapering gradually to a sharp, stiff point.
CYATHIFORM—Like a wine-glass.
CYMBIFORM—Boat-shaped.
CYPHELLÆ—Pale tubercle-like spots on the under surface of the thallus of some lichens.
CYSTIDIA—Sacs containing spores.
CYTOBLAST—A cell germ.
CYTOBLASTEMA—Protoplasm.

DECIDUOUS—Falling off.
DECOMPOUND—Having compound divisions.
DECURRENT—When the base tapers down the stem.
DECUSSATE—In pairs, alternately crossing.
DELIQUESCENT—Applied to certain fungi which soon dissolve, and to the branches of inflorescence when all trace of the principal axis is lost in the ramifications.
DENTATE—Toothed.
DESHISCENCE—Splitting into regular parts. The mode of opening of an organ.
DIAPHANOUS—Nearly transparent.
DICHOTOMOUS—Forked equally.
DICLINOUS—Having male or female sexual organs developed on different branches of a thallus.
DIFFLUENT—Readily dissolving.
DIMIDIATE—Halved.
DIŒCIOUS—When the male organs are borne on one plant, and the female on another.
DISSEPIMENT—A partition or division.

ELATER—Spiral fibres in the spore cases of Hepaticæ.
ELONGATE—Lengthened.
ENCYSTED—Enclosed in a cyst or bladder.
ENDOCHROME—Cell contents. Colouring matter of cells.
ENDOPHYTAL—Growing within plants.
ENDOSMOSE—The inward current established between fluids of different densities when separated by a membrane.
ENDOSPORIUM, ENDOSPORE—The inner coating of a spore.
EPIGYNOUS—Seated upon the female organ.
EPIPHYTAL—Growing upon plants.
EPISPORE—The outer integument of a spore.
EPIZOIC.—Growing upon animals.
ERUMPENT—Applies to certain fungi whose fructification bursts through the texture of leaves, &c.
EVANESCENT—Disappearing.
EXOSPORIUM, EXOSPORE—The outer membrane of the coat of a spore.
EXSERTED—Projecting, as the receptacle of *Trichomanes*.

FALCATE—Curved like the blade of a scythe.
FARINOSE—Mealy, the short hairs or scales having the appearance of meal or dust.
FASCICLE—A bundle.
FASCICULATE—In bundles from a common point.

FERRUGINOUS—The colour of iron-rust.
FERTILE—Bearing fruit.
FIBRILLÆ—Those organs which act for roots in lichens.
FILIFORM—Thread-like.
FILAMENTOSE—Composed of threads. Thread-like; a string of cells placed end to end
FLAGELLUM—Long whip-like processes.
FLACCID—Feeble.
FLABELLIFORM—Fan-shaped.
FOLIACEOUS—Resembling a leaf.
FLOCCI—Woolly filaments.
FROND—Used to designate the leaf of a fern and similar plants.
FURCATE—Forked.
FURFURACEOUS—Scurvy, when the plant is covered with soft scales.
FUSIFORM—Thick, tapering to each end.

GEMINATE—Produced in pairs.
GEMMIFEROUS—Bearing buds.
GENUFLEXUOUS—Bent angularly like a knee-joint.
GLABROUS—Without hairs.
GLAUCOUS—Of a hoary grey colour.
GLEBA—Chambered sporogenous tissue within a sporophore.
GONIDIA—Propagative bodies of small size, not produced directly or indirectly by any act of fertilisation.
GONOSPHERE—A ball-like agglomeration of spores.
GONUS or GONUM—In composition means either kneed or angled.
GRUMOUS—Tuberculose clusters.
GYMNOSTOMI—Naked-mouthed, mosses without a peristome.
GYNANDROSPORUS—Bearing male and female spores.

HAMATE—Hook-shaped, resembling a hook.
HASTATE—Halbert-shaped.
HEMI—Half; same as Latin Semi.
HETEROCYST—Intercalated cells of a special character differing from their neighbours.
HETEROGENOUS—Unlike, or dissimilar in kind.
HEXAHEDRICAL—Having six sides.
HIRSUTE—Hairy.
HISPID—Rough with bristles.
HOMOGENOUS—Of the same kind. Consisting of elements of a like nature.
HORMOGONE—Special reproductive bodies, composed of a chain of cells.
HYPHÆ—The element of a thallus.
HYALINE—Transparent.
HYMENIUM—The spore-bearing surface of a fungus.
HYPNOSPORANGIUM—Sporangium enclosing hypnospores.
HYPNOSPORE—Spores which repose (sleep) some time before germinating—"resting spores."
HYPOTHALLUS—The mycelium of certain fungi.
HYPOGYNOUS—Seated beneath the female organ.
HYPOTHECIUM—The substance which immediately invests the perithecium of lichens.

IDIO-ANDROSPOROUS—Neuter individuals, producing androspores (in *Edogonium*).
INCUBOUS—The opposite of succubous. Incubous leaves are imbricated over each other from the base towards the apex, whereas in succubous leaves they are imbricated in the contrary direction.
INDEHISCENT—Not opening.
INDUSIUM applied to the skin covering the sorus of some ferns.
INTERCALATED—Interspersed, placed between others.
INTERCELLULAR—Between the cells.
INTERSTITIAL—Placed between.
ISOLATED—Detached, placed by itself.
ISOSPORE—Applied to spores which are all of one size, or kind, in the same plant.

LACINIATE—Cut or divided.
LACUNA—A depression, cavity, or intercellular space.
LAMELLÆ—Thin plates or membranes parallel to each other.
LAMELLOSE—Formed of layers or plates superimposed.
LAMINA—Blade of leaf or frond.
LANCEOLATE—Shaped like a lance.
LEPIDOTE—Covered with scales or scurf; Lepis, a scale.
LINEAR—Very narrow, the length greatly exceeding the breadth.

LIRELLA—Sessile linear apothecium of lichens.
LUBRICOUS—Slippery.
LUNATE—Crescent-shaped.

MACRANDROUS—Having elongated male plants.
MACROGONIDIA—Large gonidia.
MAMILLÆ—Little glandular prominences.
MATRICAL—Belonging to the matrix.
MEDULLA—Central tissue within the rind of a fungus-body. In lichens; same as stratum medullary-pith layer.
MESOPHYLLIC—In the middle of a leaf or frond.
MESOS—The middle; in composition, Meso.
MESOSPORIUM, MESOSPORE—The middle membrane of the coat of a spore.
METAGENESIS—A kind of alternation of generation.
MICROGONIDIA—Small gonidiá.
MICROPYLE—The aperture.
MICROS—Small; in composition, Micro.
MICROSOMA—Small granule.
MITRIFORM—Mitre-shaped.
MOBILE—Movable, or capable of spontaneous movement.
MONILIFORM—Necklace-shaped, contracted at regular intervals.
MONŒCIOUS—When the male and female flowers are distinct, but on the same plant.
MONOS—One; in composition, Mono and Mon.
MOTILE—Having power of self-motion, though unconscious, as the spores of certain Algæ.
MUCRO—A stiff point abruptly terminating an organ.
MUCUS—A definite peculiar matter, forming a covering of some Algæ.
MULTICELLULAR—Composed of many cells.
MULTILOCULAR—Containing many cells or cavities.
MULTIPARTITE—Divided into many parts.
MURICATE—Covered with firm short points or excresences.
MYCELIUM—The spawn, or root-like slender fibres that traverse the soil, in many kinds of fungi.
MYCETOGENETIC—Produced by fungi.
MYCOSIS—A disease of animal tissue, due to the vegetative activity of a Eurotium.

NANANDROUS—Having short or dwarf male plants.
NAVICULAR—Hollowed like a boat.
NODULOSE—Knotted, or with swollen joints.
NUCLEUS—The central germ around which a cell is formed. Small spherical bodies contained within spores or other cells.

OBCORDATE—Inversely heart-shaped.
OCTONATE—Eight together.
OLEAGINOUS—Oily, or resembling oil.
OLIGOS—Few, or in small number; in composition, Oligo and Olig.
OÖGONIUM—A kind of ovarian sac containing spores which, when liberated, are called oospores.
OÖSPORE—Spores produced in an ovarian sac.
OPERCULUM—The lid or cover of a capsule.
OSTIOLUM—The orifice of the perithecium and apothecium.

PAPILLATED, or PAPILLOSE—Covered with small nipple-like prominences.
PARAPHYSES—Filaments sometimes articulated, occurring in the fructification of mosses.
PARASITE—Organism living on or in, and at the expense of another organism.
PARENCHYMA—Compressed or hexagonal cellular tissue.
PARENCHYMATOUS—Resembling the cellular tissue termed "parenchyma."
PERI—Around; in Latin, Circa.
PARIETAL—Growing by, or to, the wall.
PERITHECIUM—The envelope surrounding the masses of fructificatiou in fungi and lichens.
PERISTOME—The opening of the sporangium of mosses after the removal of the calyptra and operculum.
PARTHENOGENESIS—Production of fertile seeds without sexual impregnation.
PARTHENOGONIDIA—Gonidia produced without fecundation.
PATENT—Spreading widely.
PATHOGENOUS—Producing disease.

PECTINATE—Pinnatifid, with narrow, close segments, like the teeth of a comb.
PEDICELLATE—Having a foot, or stem.
PELTATE—When the stalk is fixed in the disk instead of the margin.
PELTA—Is the flat shield, without any elevated rim of some lichens.
PENICILLATE—Resembling a camel's hair pencil.
PENTAHEDRICAL—Having five sides.
PERICARPIUM—Covering or tegument of fruit.
PERICHÆTIAL LEAVES—Are those at the base of the fruit-stalk of a moss.
PERIDERM, PERIDERMIC—The enclosing membrane.
PERIPHERAL—The outer portion of a circle.
PERITHECIA—The cysts or capsules containing the asci.
PETIOLE—The footstalk of a leaf.
PETIOLULE—The footstalk of a leaflet.
PILEUS—The cap portion of a mushroom.
PILIFEROUS—Bearing hairs.
PILOSE—Provided with hairs.
PINNA—A leaflet.
PINNATE—When a leaf is divided into leaflets.
PINNATIFID—When the leaf is very deeply lobed.
PINNULE—The secondary leaflet.
PLATYS—Large or broad; in composition, Platy; in Latin, Latus and Late.
PLEION—Several; in composition, Pleio; in Latin, Pluri.
PLEUROCARPI—Mosses with the fructification proceeding latterly from the axils of the leaves.
PLICATE—Folded, or plaited.
PLUMOSE—Feathery, or like a feather.
PODETIA—The stalk; like elongations of the thallus of some lichens.
POGON—Beard; in Latin, Barba.
POLYMORPHISM, POLYMORPHIC—Having many forms.
PRIMORDIAL—Original, existing from the beginning.
PROLIFEROUS—So called when young plants are produced upon the fronds.
PROTHALLUS—The false thallus first formed on germination of a spore.
PROTOPLASM—The matter concerned in the early formation of nuclei and cells.
PSEUDO-BRANCHES—False branches, or resembling branches.
PSEUDO-RAMOSE—Having false branches.
PUBESCENT—Downy.
PULVINATE—Cushion-shaped.
PYCNIDES—Are large thick-walled spermagones, of which the sterigmata are simple, inarticulate, tubular, tapering pedicels, called "stylospores."
PYRENOCARP—Cup-shaped ascocarp, with the margin incurved so as to form a narrow-mouthed cavity. The same as perithecium.
PYRIFORM—Pear-shaped.

QUADRI-RADIATE—With four radii, or rays.
QUATERNATE—Arranged in fours.

RAMULUS—A small, or secondary branch.
RECEPTACLE—In ferns, that part of the vein on which the sorus is seated.
RECEPTACULUM—A term of varying signification, most usually implying a hollowed-out body containing other bodies. The same as stroma; stalk of a discocarp, &c., in lichens; cup of the thallus containing soredia.
RENIFORM—Kidney-shaped.
REPLICATE—Folded back.
RESTING-SPORE—A spore which becomes quiescent, or rests for a period, more or less long before germination.
RESUPINATE—Turned on its back.
REVOLUTE—Rolled back.
RHACHIS—In ferns, that part of the stem of the frond upon which the pinnæ are placed, or the portion above the stipes.
RHIZOID—Resembling, or analogous to, a root.
RHIZOME—Rootstock.
ROSTRATE—Terminating with a beak.
RUGOSE—Rough, or wrinkled.

SACCATE—In the form of a bag.
SAPROPHYTE—A plant which lives upon dead organic matter, thus differing from the parasite which lives upon living organic matter.
SCABROUS—Rough, from little asperities.
SCALARIFORM—Barred or crossed like the steps of a ladder.
SCROBICULATE—Marked with little pits.

SCUTATE—Buckler-shaped.
SCUTELLUM—Is a shield with an elevated rim, formed by the thallus of some lichens.
SEGMENTATION—Dividing into segments.
SEGREGATE—To separate from others, or set apart.
SEMI—Prefix signifying "half."
SEPTUM—A partition or division.
SERRATE—Cut like the teeth of a saw.
SERRULATE—When the teeth are very fine.
SESSILE—Stalkless.
SETOSE—Bristle.
SIMPLE—Not divided.
SINUS—A depression or notch.
SIGMOID—Shaped like the letter S.
SOREDIA—Is a scattered powder found upon lichens.
SORIFEROUS—Bearing the fructification.
SORUS—A seed-patch of a fern.
SPERMAGONES—Are minute open cavities in the thallus of lichens, containing filaments; "sterigmata."
SPERMAGONIA—Spore-cases.
SPERMATOZOA, SPERMATOZOIDS—Thread-like bodies possessed of motion, supposed to have fecundative power.
SPORANGIUM, SPORANGIA—A spore-case, having spores produced within it.
SPORE-CASE—Case containing the spores of ferns and their allies.
SPORIFEROUS—Bearing spores.
SPOROCARPIUM—Covering or capsule enclosing spores, or carpospores.
SPORODERM—The coating or covering of a spore.
SPORULES—Minute spore-like bodies.
STERIGMATA—Threads bearing colourless bodies; "spermatia."—Basidium.
STIPES—A stalk; in ferns, the lower part of the stem.
STOMA, STOMIUM—The opening provided on the side of the spore-case of ferns for the escapement of spores.
STRATOSE—Arranged in layers, or strata.
STRATUM—A layer, or extended bed.
STRIÆ—Parallel lines or shallow grooves.
STRIGOSE—Covered with rough, strong appressed hairs.
STROMA—Compound fungus-body having the form of a cushion, crust, foliaceous expansion, or erect unbranched or branched shrub-like body.
SUB—A common prefix, indicating "almost" or "nearly."
SUBICULUM—The under-layer.
SUBULATE—Shaped like an awl.
SUCCUBUS ("succumbo," to couch down)—The stipular appendages of certain Hepaticæ. (*See* also Succubous.)
SUCCUBOUS—Leaves are said to be succubous when the anterior margin of each leaf, as set on the branches, passes beneath the posterior margin of that which succeeds it.
SULCATE—Furrowed or grooved.

TANGENIAL—In the direction of a tangent. Touching a straight line on the arc of a circle.
TEGUMENT—A covering or membrane.
TELEUTOSPORE—In Uredineæ; spore formed by abjunction on, but not separating from, a sterigma, producing in germination, which takes place after a resting period, a promycelium.
TERETE—Cylindrical, long, round.
TERNATE—In threes.
TETRAHEDRICAL—Having four sides.
TETRASPORES—Certain spores produced in fours.
THALLUS—A frond or expansion somewhat resembling a leaf.
THECA=ASCUS.
TOMENTOSE—Having a close covering of dense downy hairs.
TORULOSE—Almost synonymous with moniliform.
TRICHOGONIA—The female reproductive organs in Batrachosperms.
TRICHOME—The thread or filament of filamentose algæ.
TRICHOTOMOUS—Dividing in threes.
TRUNCATE—Terminating very abruptly.
TUBERCULATE—Covered with warts or tubercles.

UMBONATE—Applied usually when the organ or plant is furnished with a central conical elevation.
UNDULATE—Wavy.
UNICELLULAR—Literally, composed of one cell.
UTERUS—In Gastromycetes; same as Peridium.

VACUOLE—Drops which are seen in the interior of the protoplasm of cells.
VAGINA, VAGINATE—A sheath, sheathing.
VELUM—The veil of Agarics.
VENATION—Arrangement of veins and venules.
VENTRICOSE—Bellied : when an organ is swelled out.
VERRUCOSE—Covered with warts.
VERTICILLATE—Arranged in whorls.
VESICLE—A bladder-like cavity.
VIBRATILE—That moves to and fro, or vibrates.
VIRESCENT—Green.
VOLVA—Wrapper ; the organ which encloses in a young state many fungi.

ZOÖGONIDIA—Gonidia endowed with active motion.
ZOÖSPORANGIUM, ZOÖSPORANGE—Sporangium enclosing zoospores.
ZOÖSPORES—Locomotive motile spores.
ZYGOSPORES—A spore resulting from conjugation.

MM.—MILLIMETRES.
μ=MICRO-MILLIMETRES.
♂=MALE.
♀=FEMALE.
☿=HERMAPHRODITE.

LIST OF AUTHORITIES.

Abbreviations.		Full Name.
Ag.	...	Agardh, J. G. and C. A.
Archer	...	Archer, W.
Aresch.	...	Areschoug, J. Ehr.
Bail.	...	Bailey, J. W.
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Bisset	...	Bisset, J. P.
Boldt	...	Boldt, Robert
Born.	...	Bornet, Ed.
A. Br.	...	Braun, A.
Bréb.	..	Brébisson, A.
Cleve	...	Cleve, P. T.
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Cram.	...	Cramer, Dr. Carl Edward
DC.	...	Decandolle
De Bary	...	De Bary, A.
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De Toni	...	De Toni, G. B.
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Hansg.	...	Hansgirg, A.
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Hass.	...	Hassall, Dr. A. H.
Henfr.	...	Henfrey, Arthus
Jenn.	...	Jenner, Ed.
Kirchn.	...	Kirchner, Dr. O.
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Lagh.	...	Lagerheim, Dr. G.
Lenor.	...	Lenormand, M. Rene
Lingb.	...	Lingbye, H. C.
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Meyen	...	Meyen
Meyne	...	Meyne
Moeb.	...	Moebius, M.
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Næg.	...	Nægeli, C.
Nordst.	...	Nordstedt, Otto
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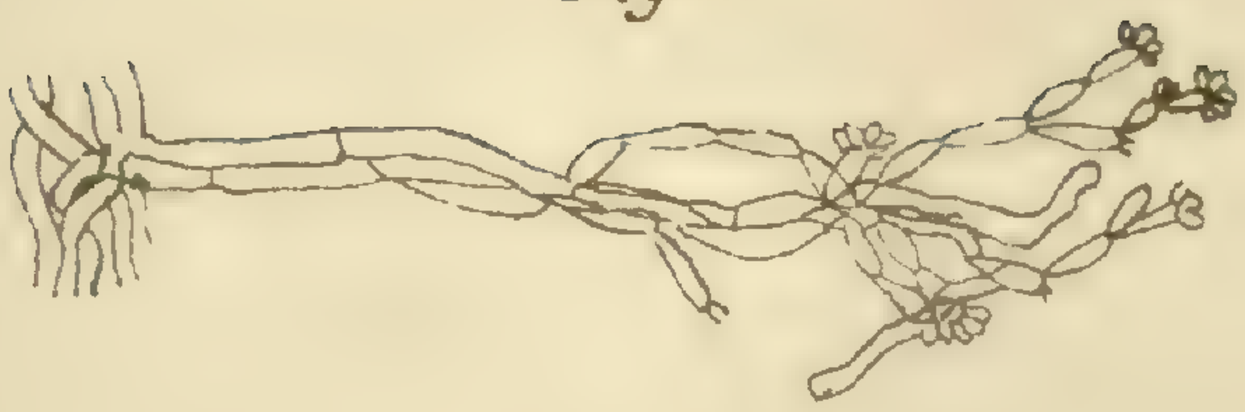
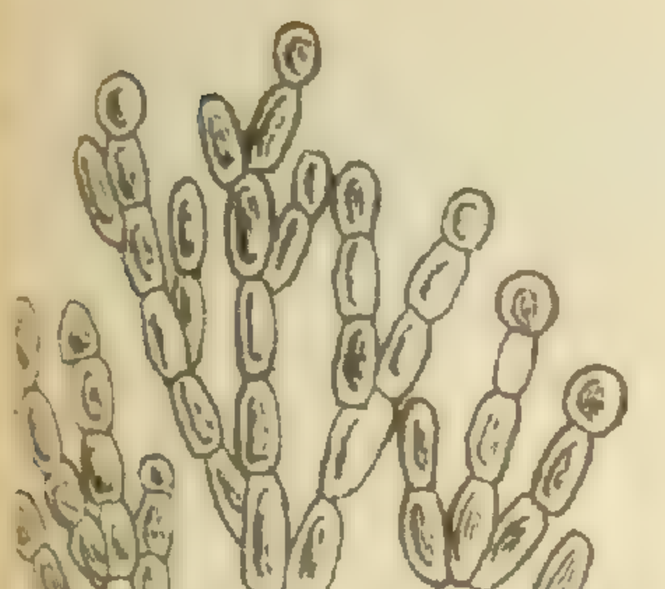
Fig. 1.





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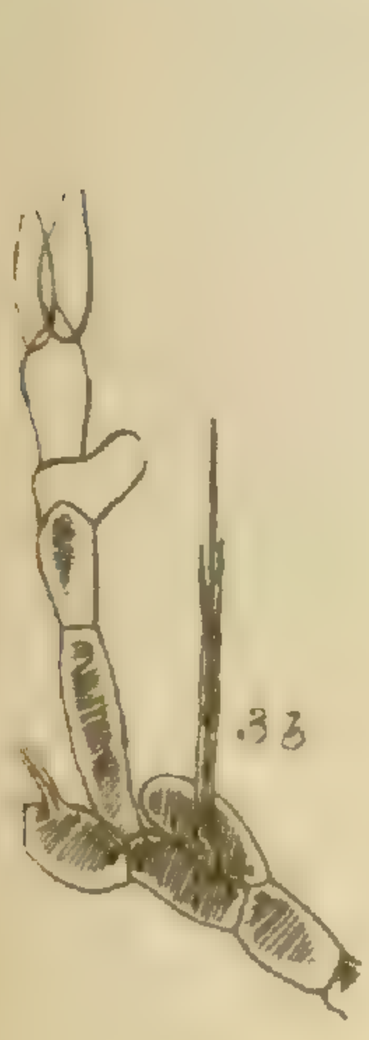

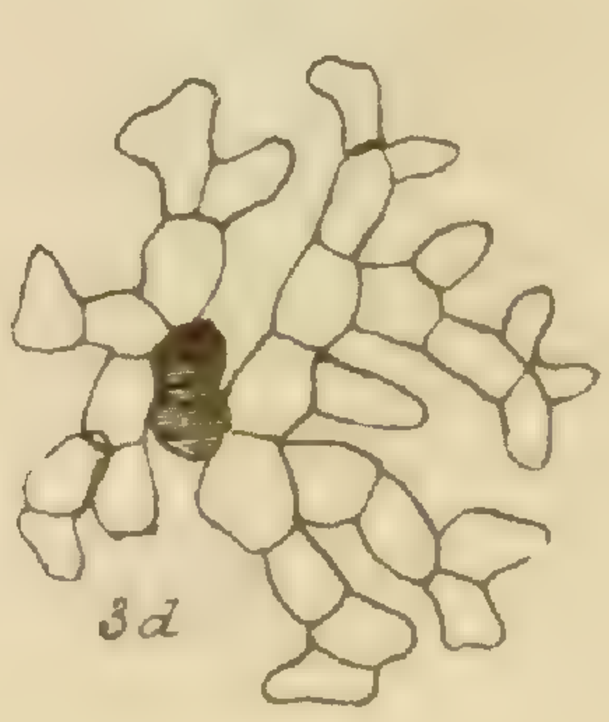

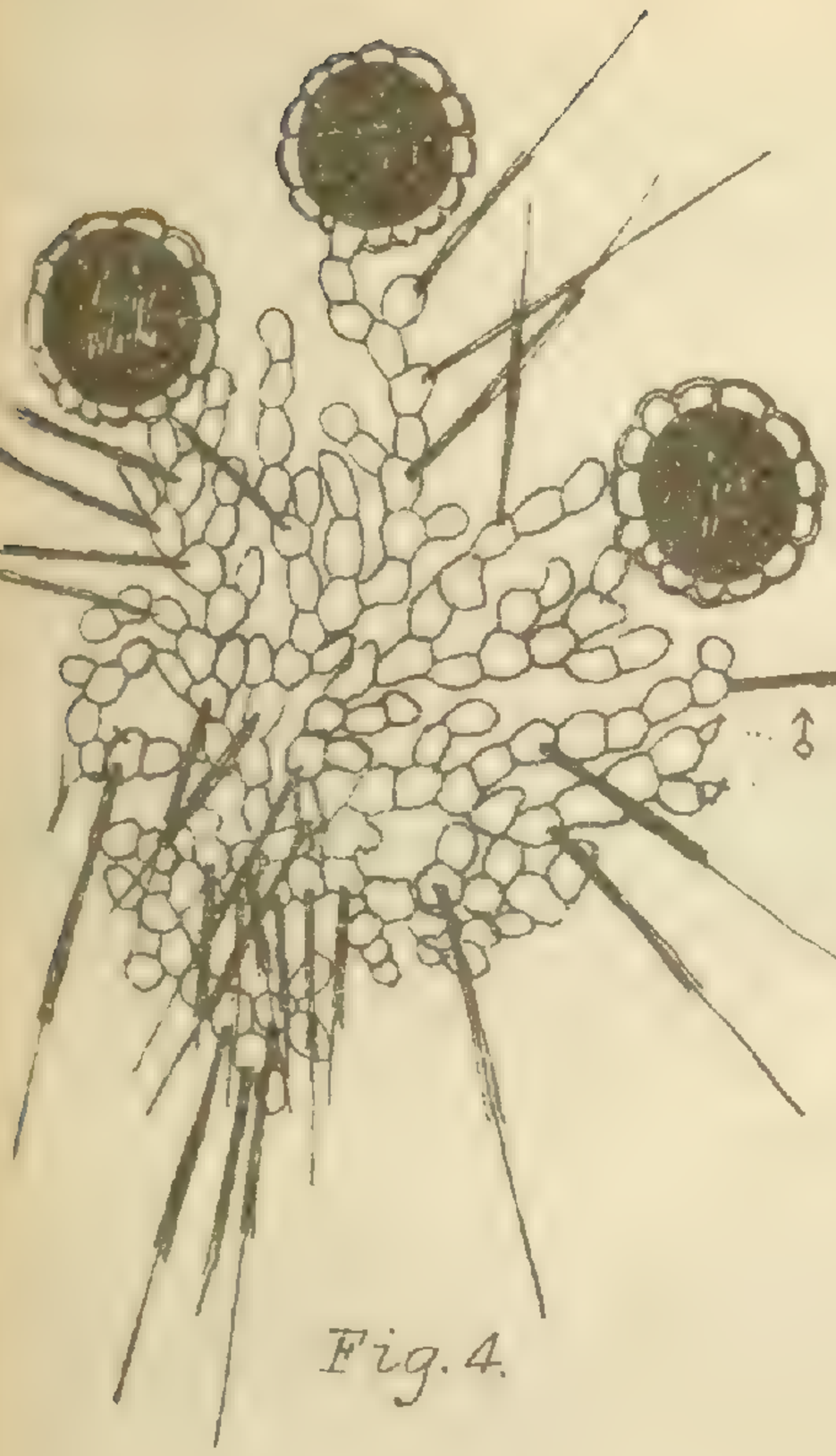

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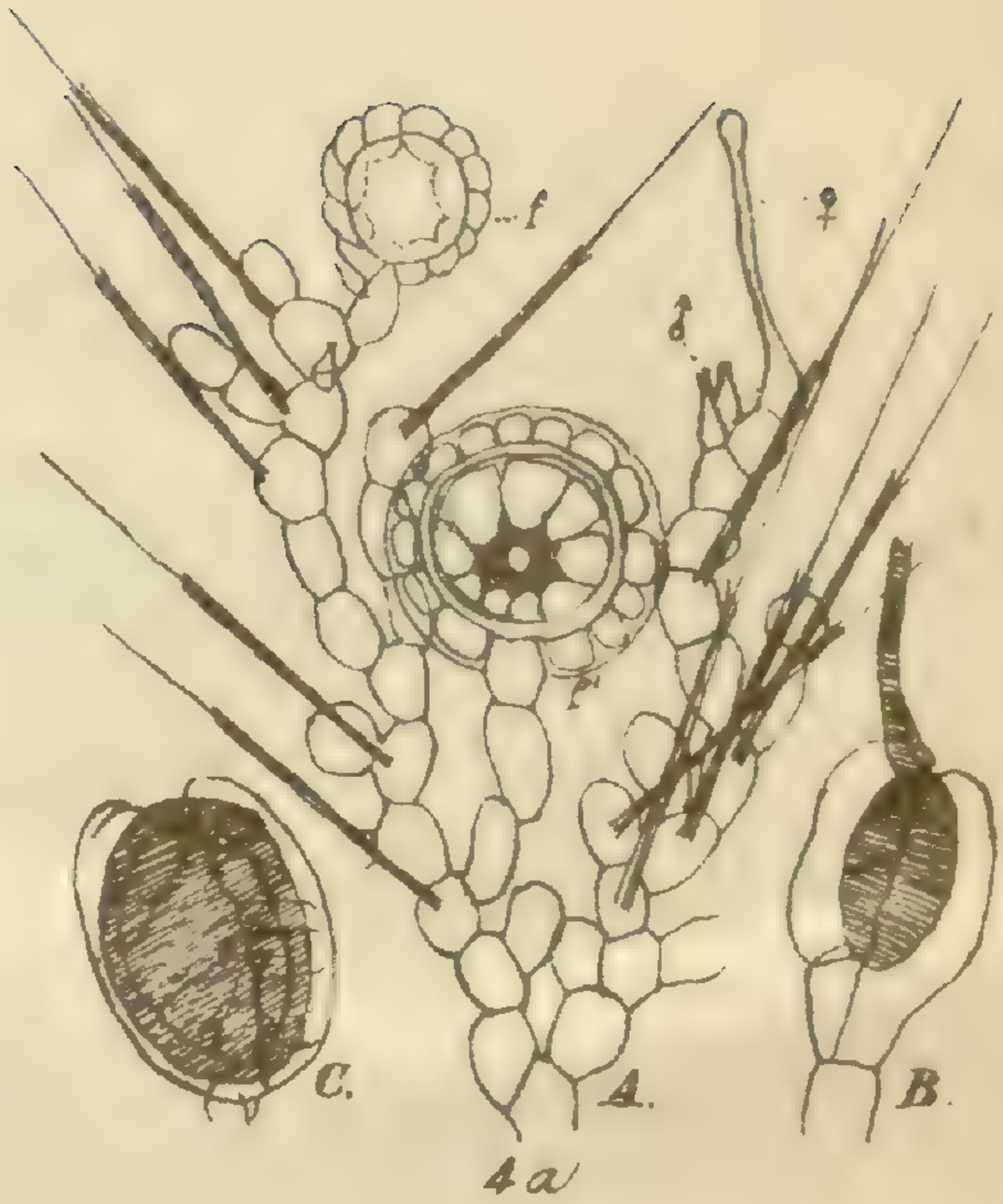

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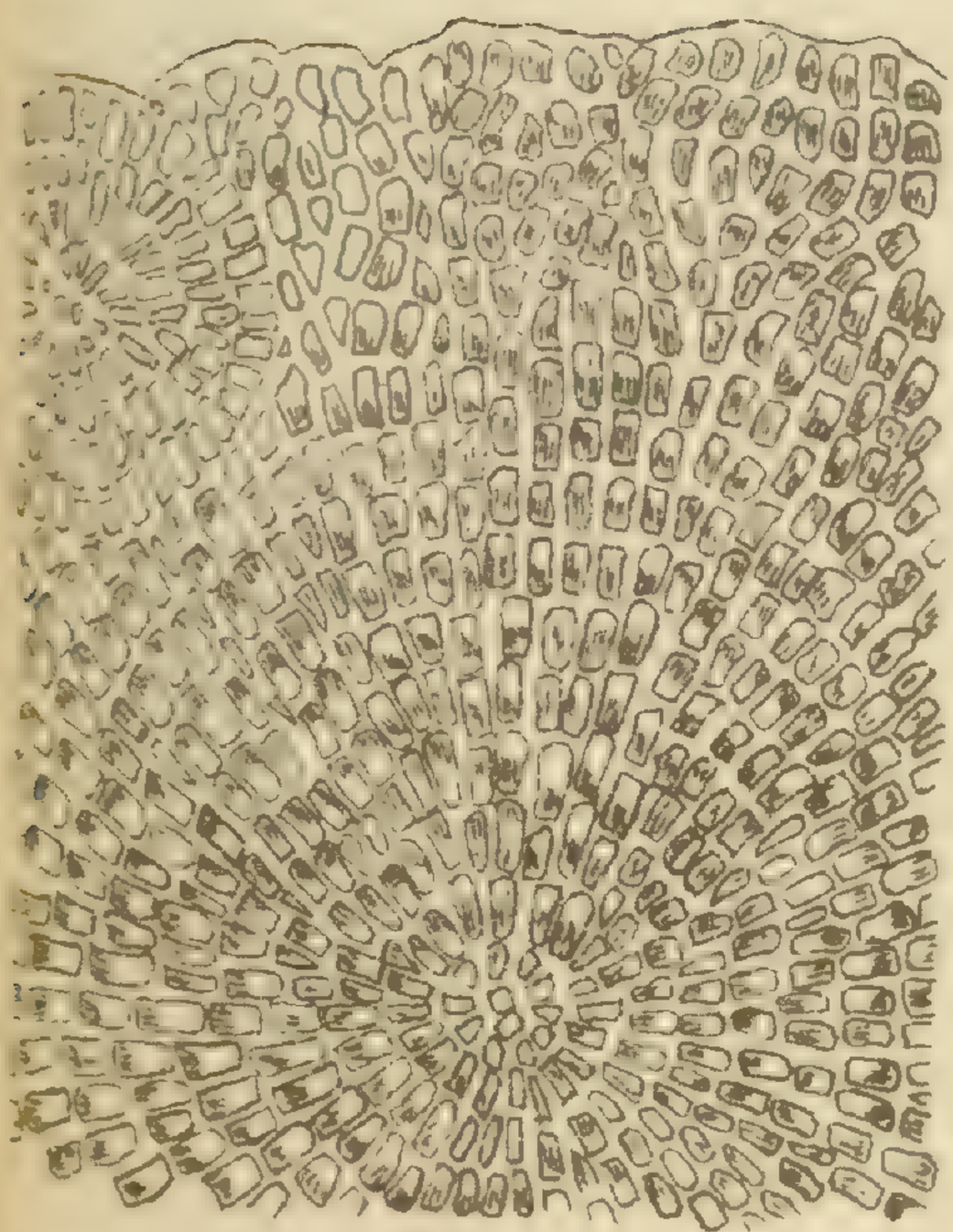

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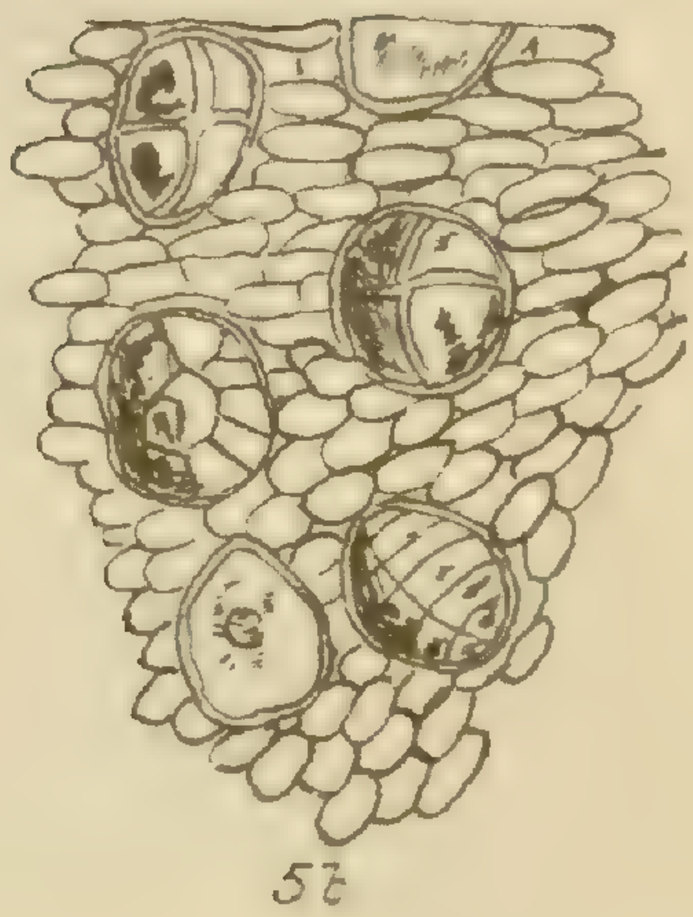

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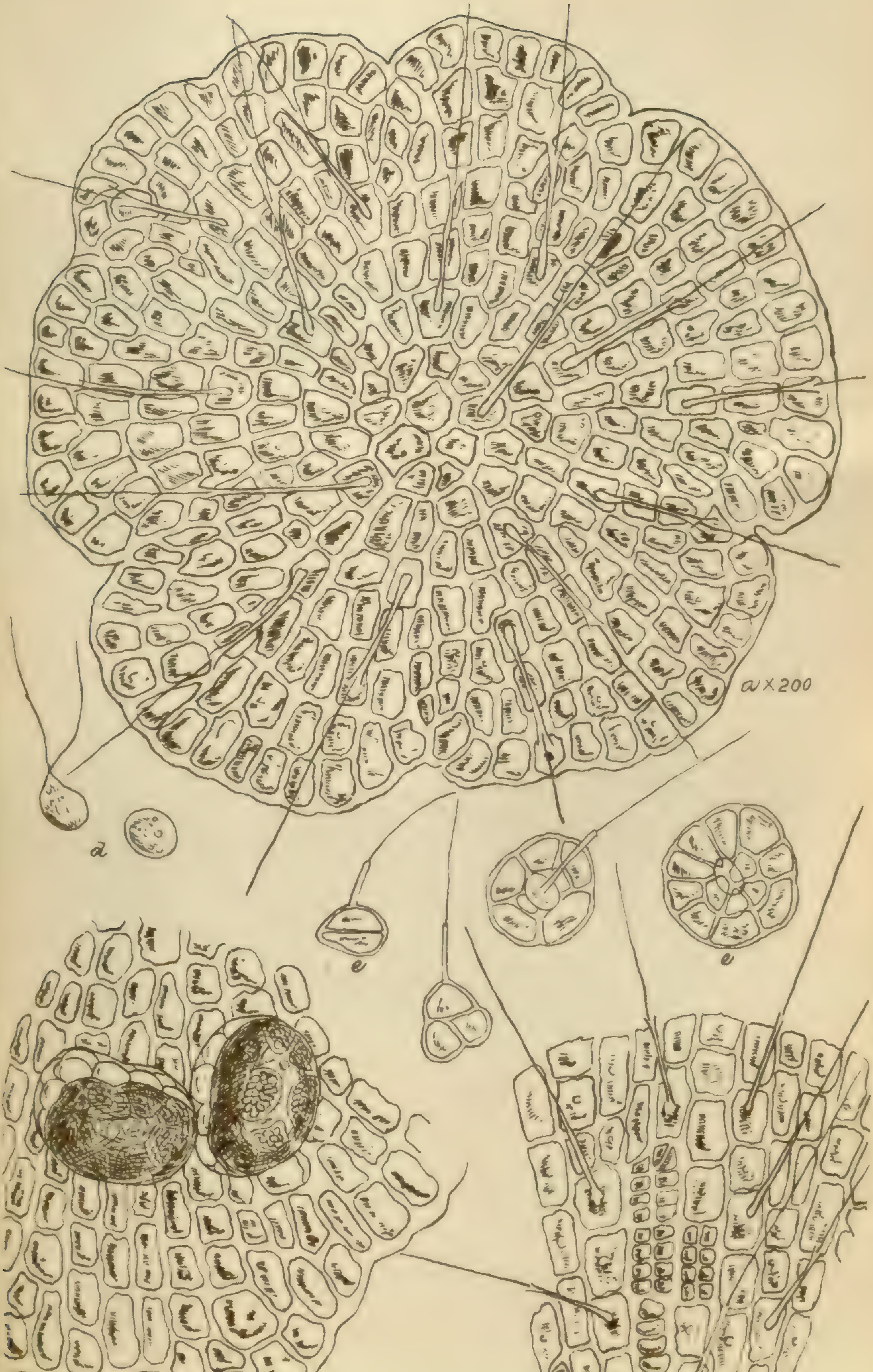

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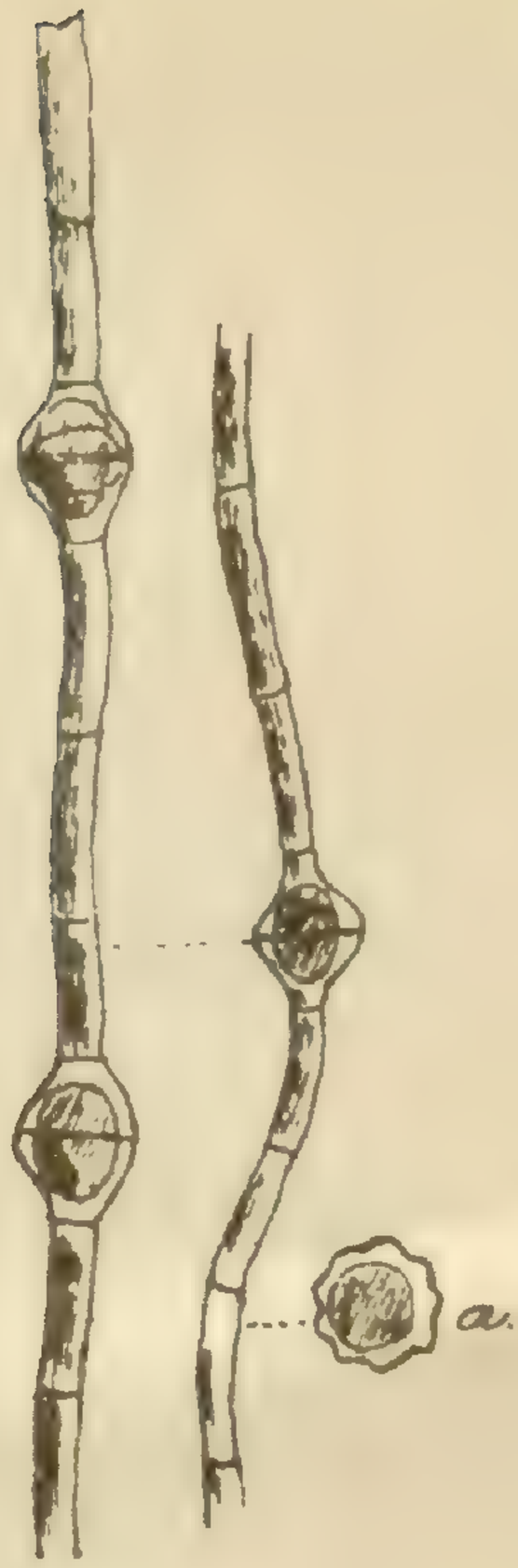

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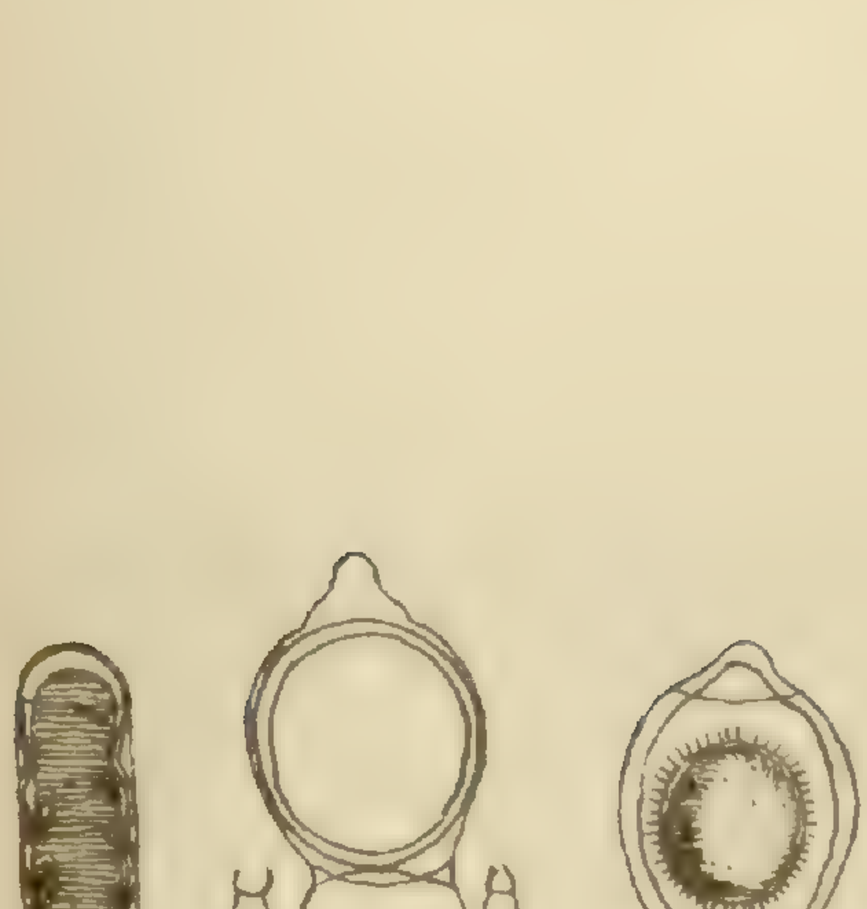

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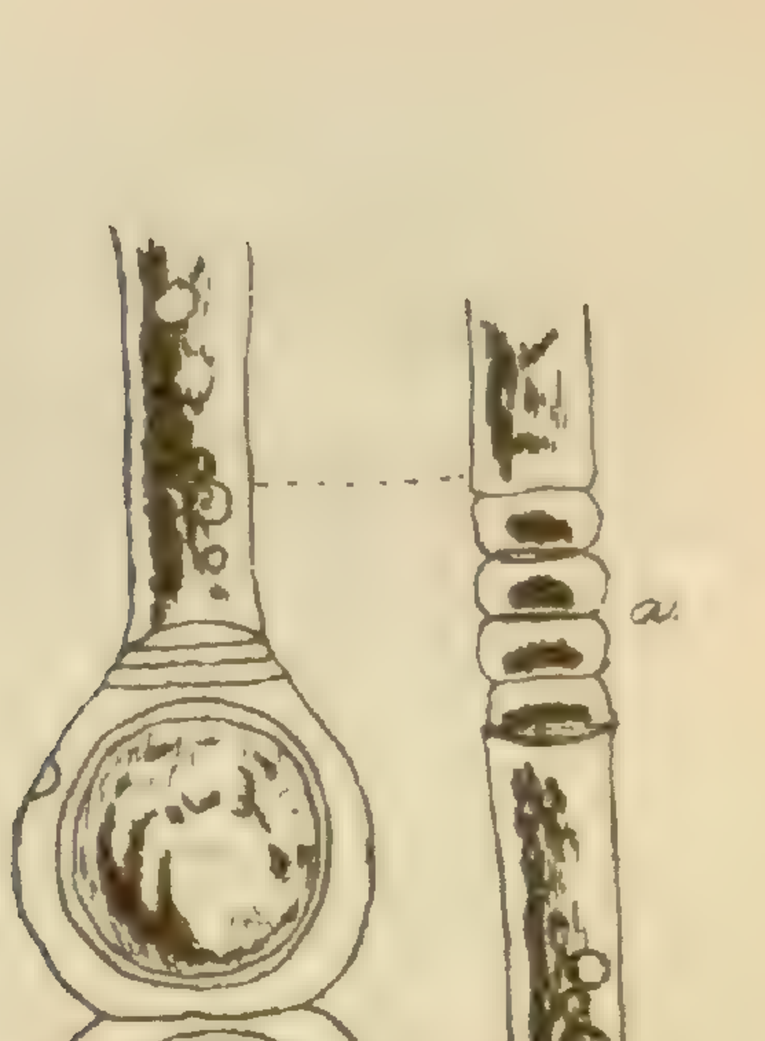

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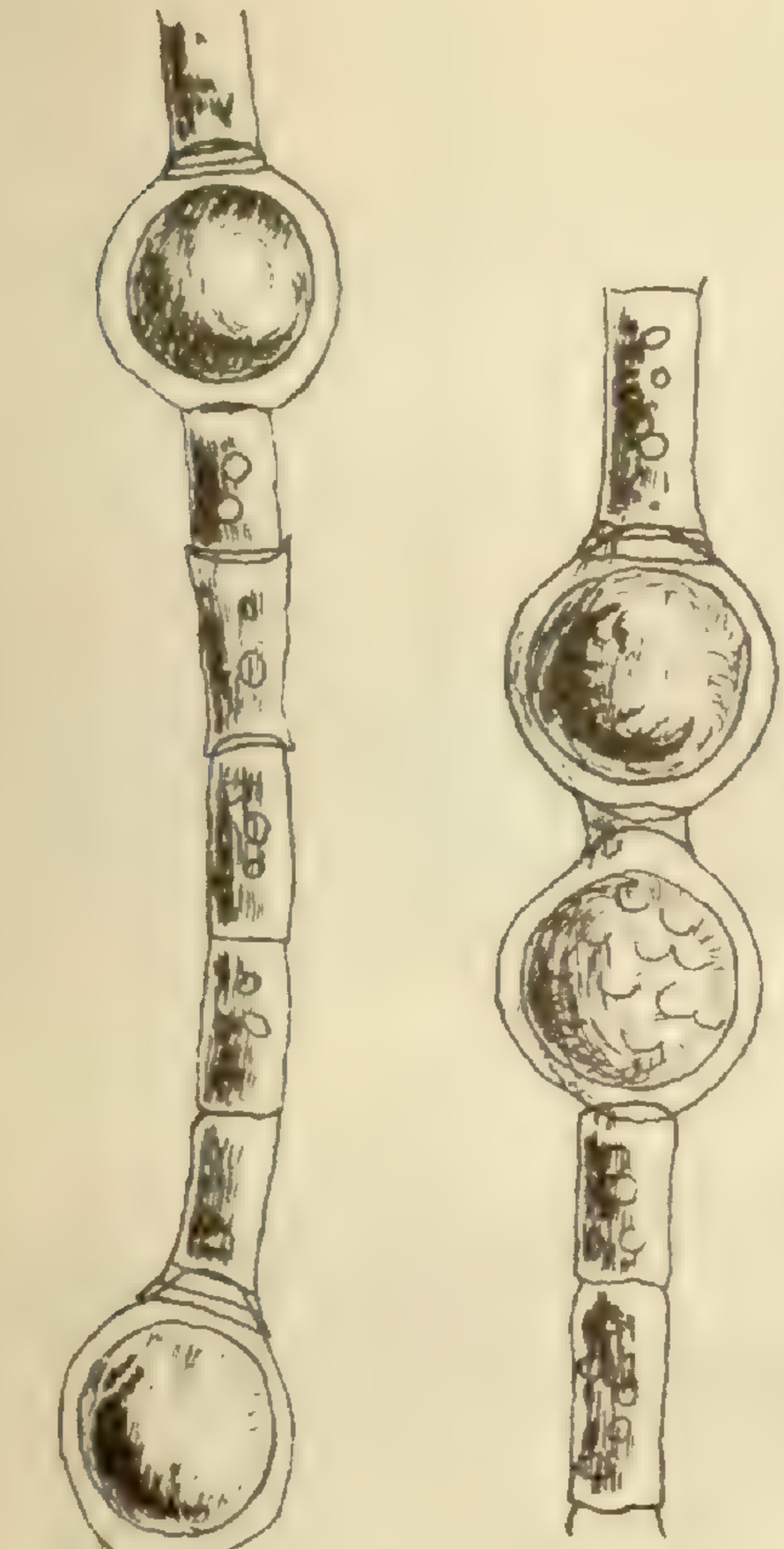

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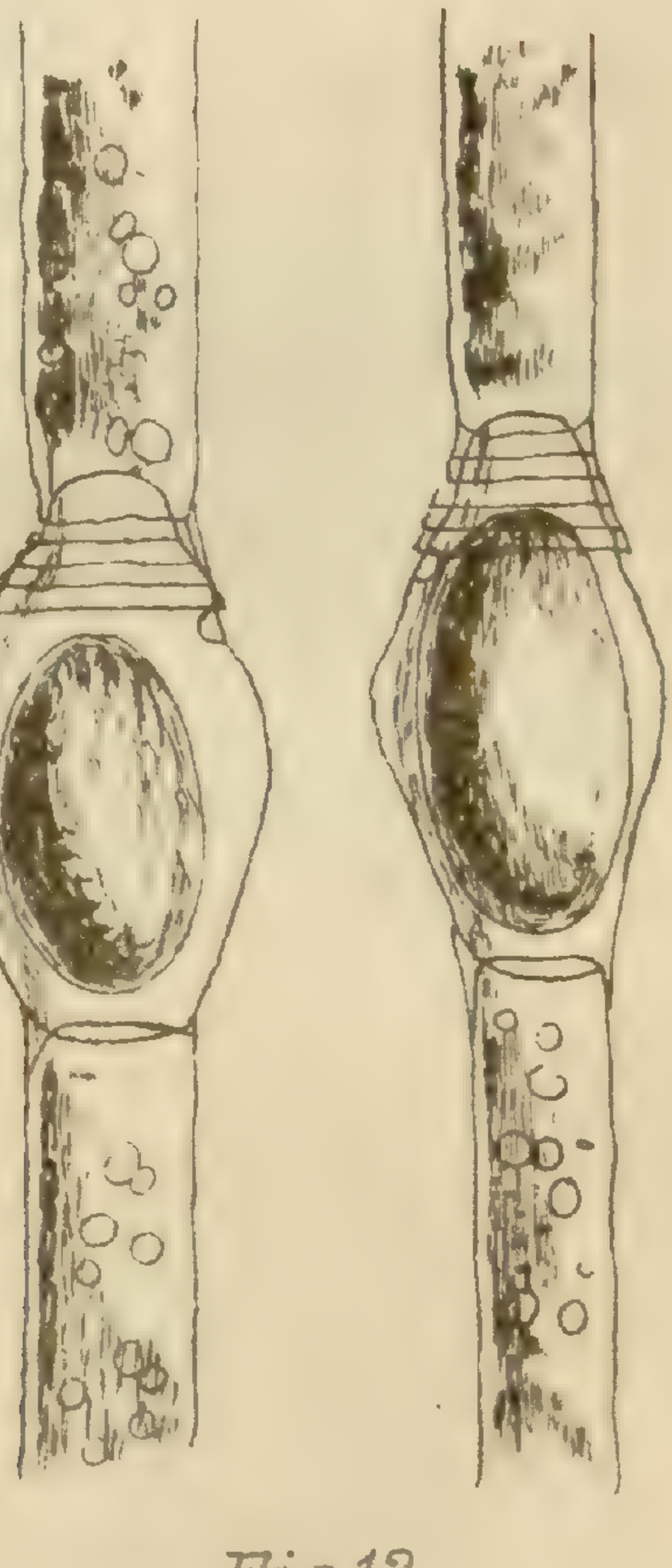


Fig. 12.

a

Red
Red
C

Red
d.
Red
Red
e
Red

f

Red

g

Red
Red
i
Red
Red
Red
k
Red
Red
Red

h

l x 700
Red
Red
Red

n

o

p

q
Red
Red

r
Red

h 2
Red
Red
Red

b

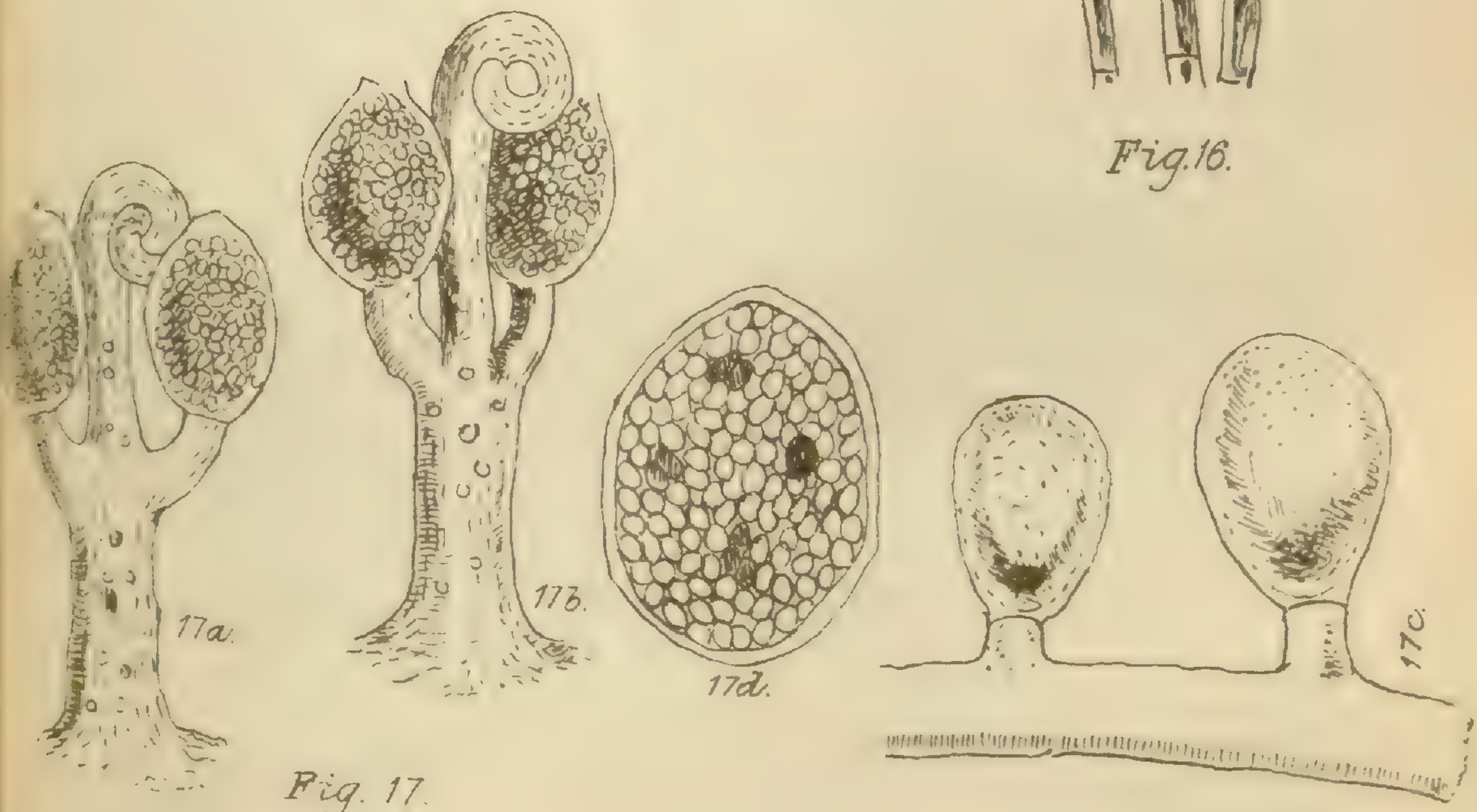
m

13 s

Fig. 14.

Fig. 15.

Fig. 16.



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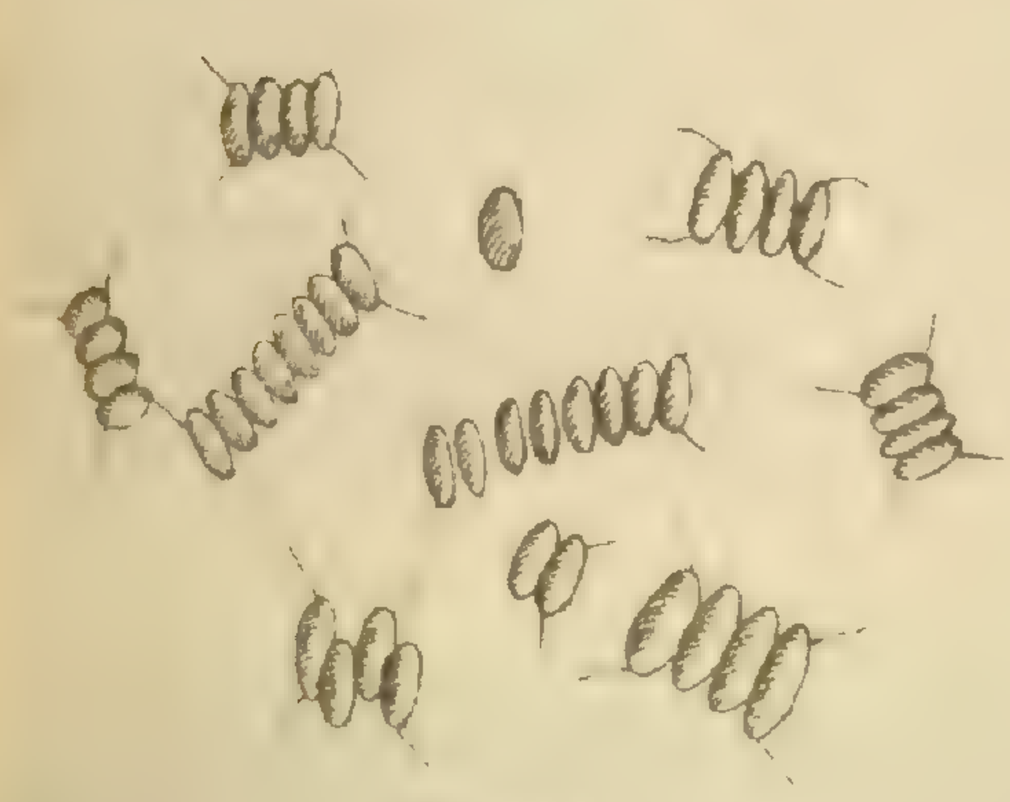

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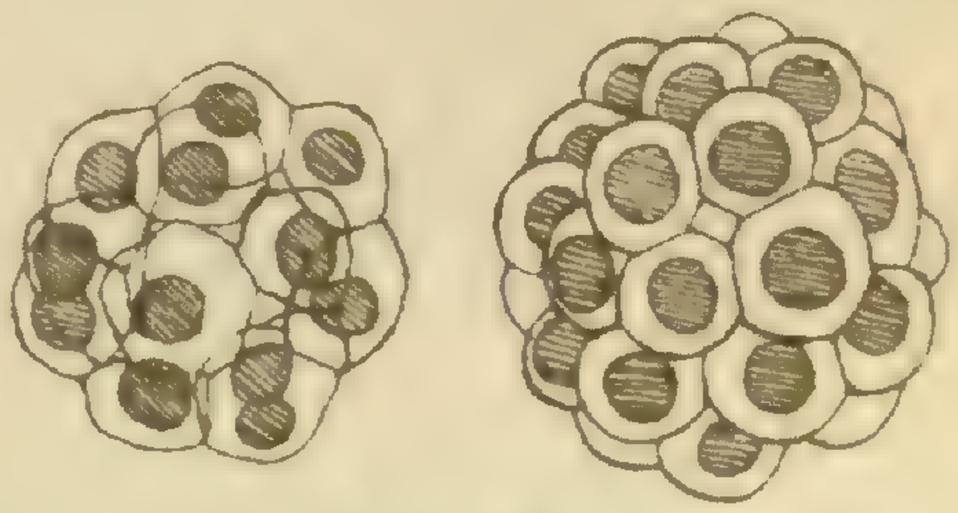

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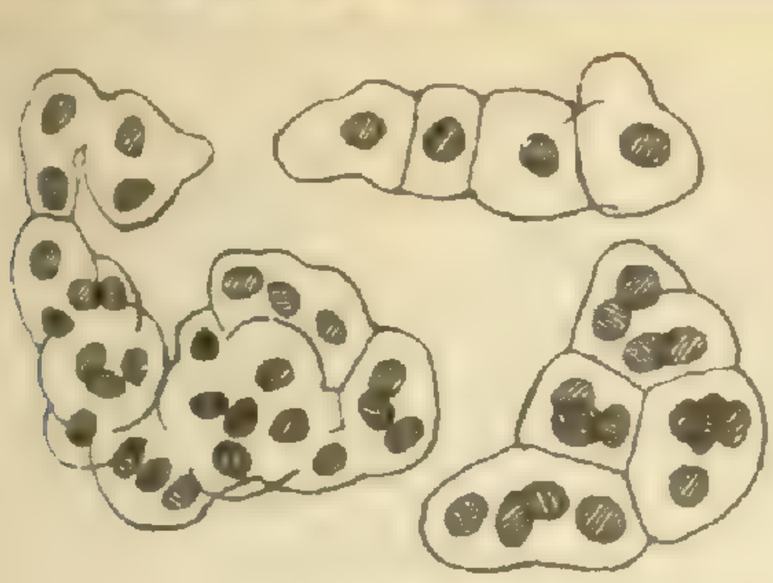

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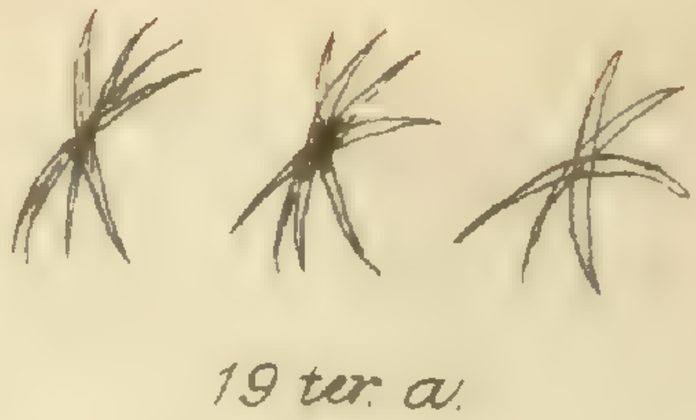

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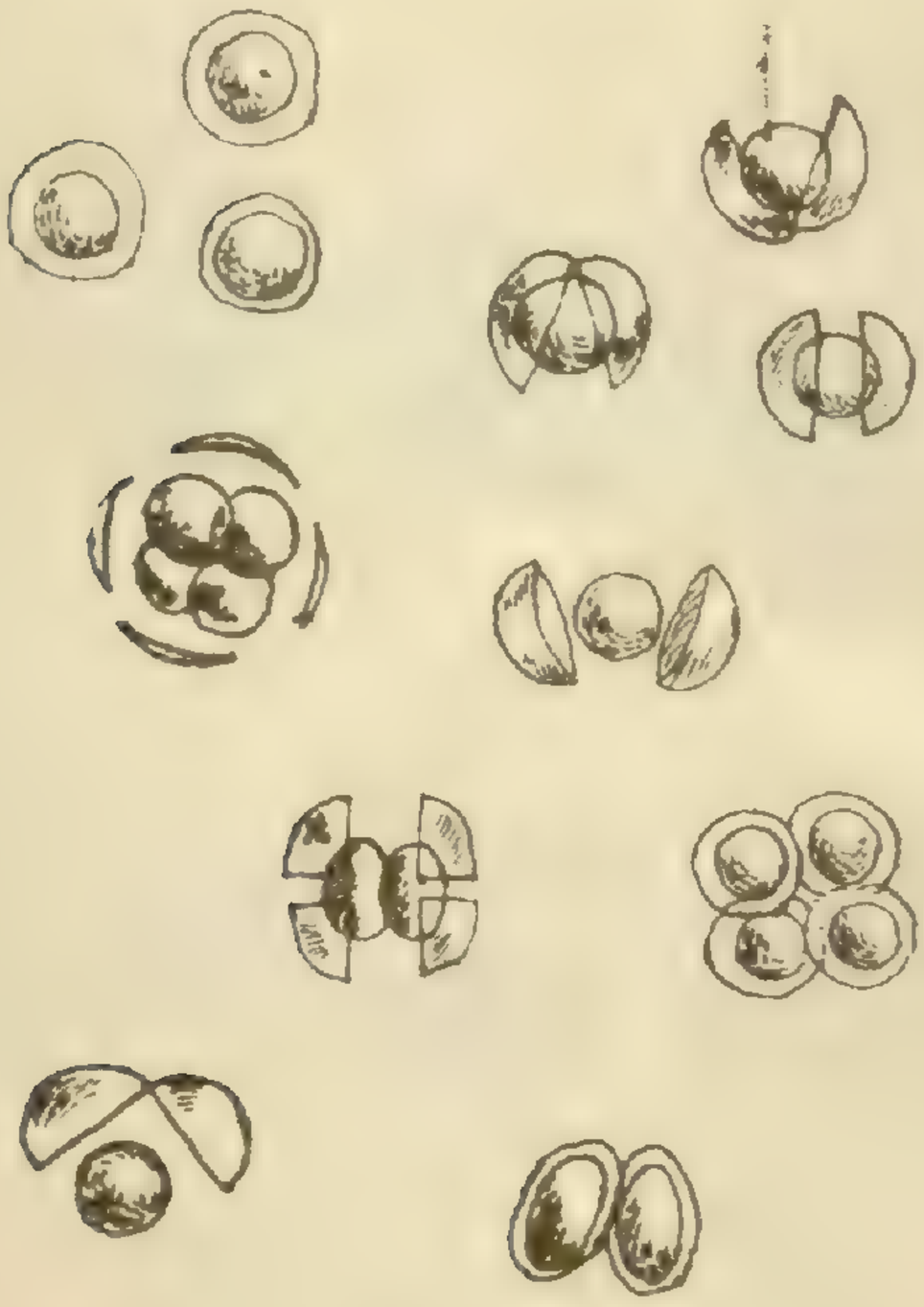

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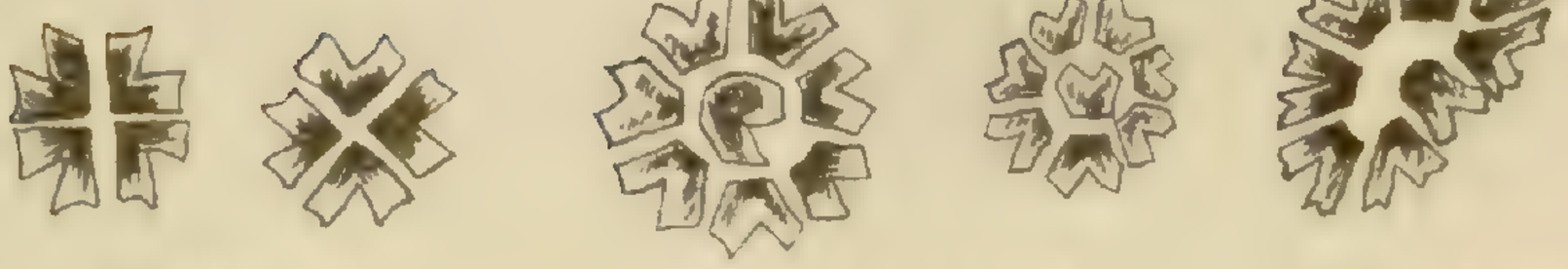

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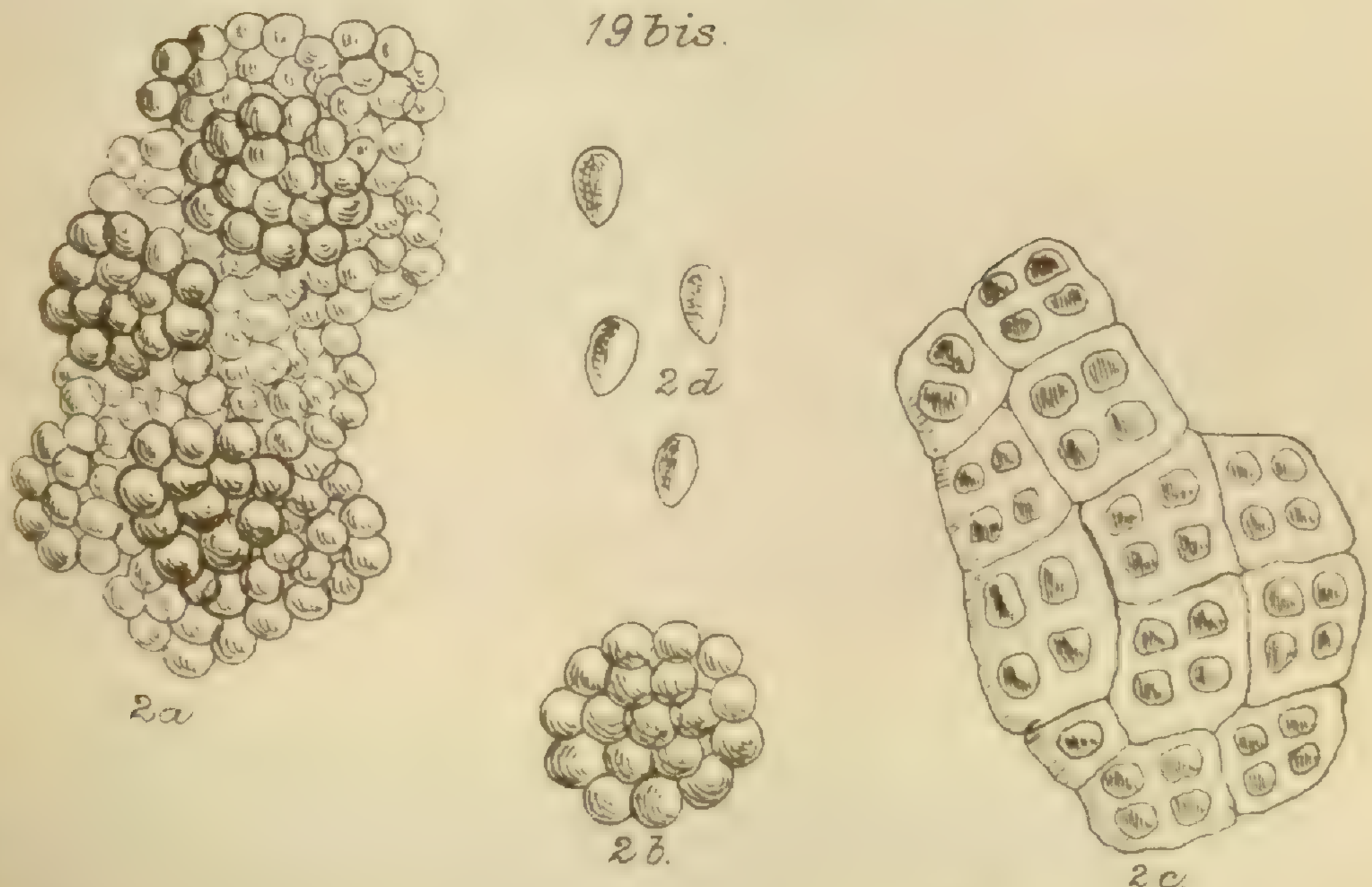

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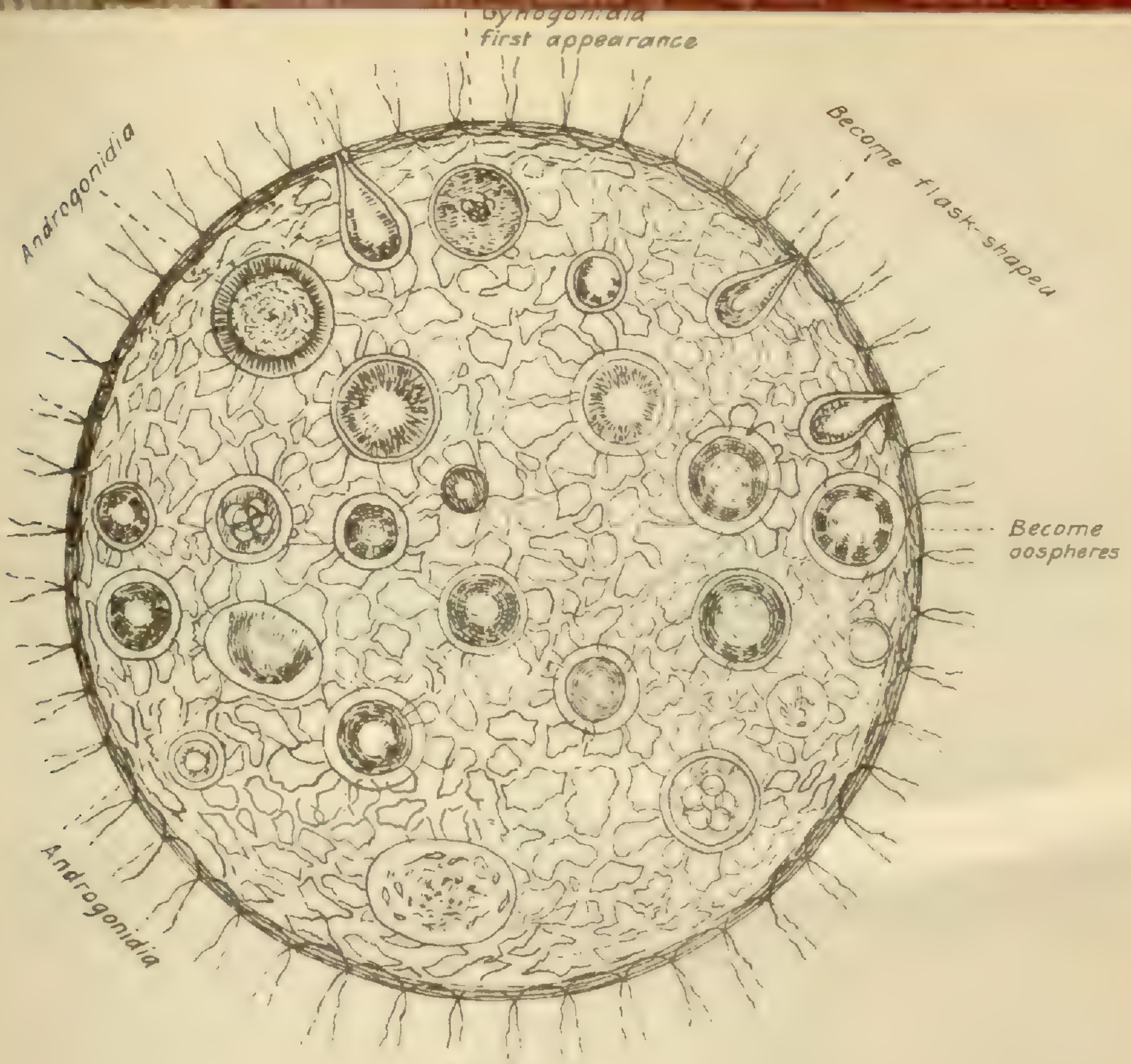

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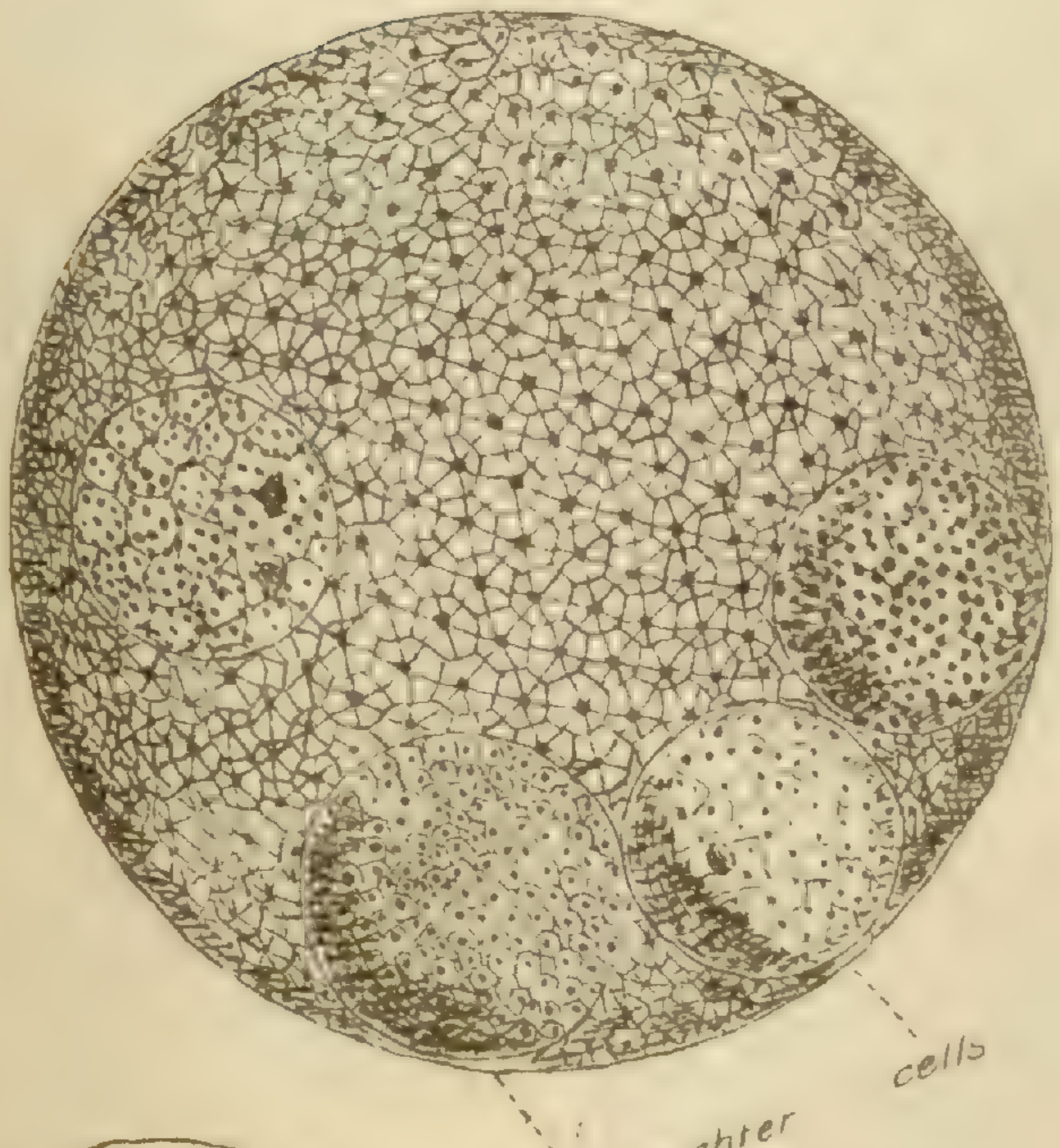
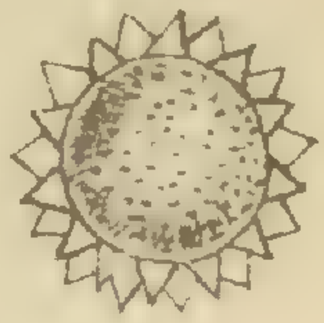
22 bis. a.





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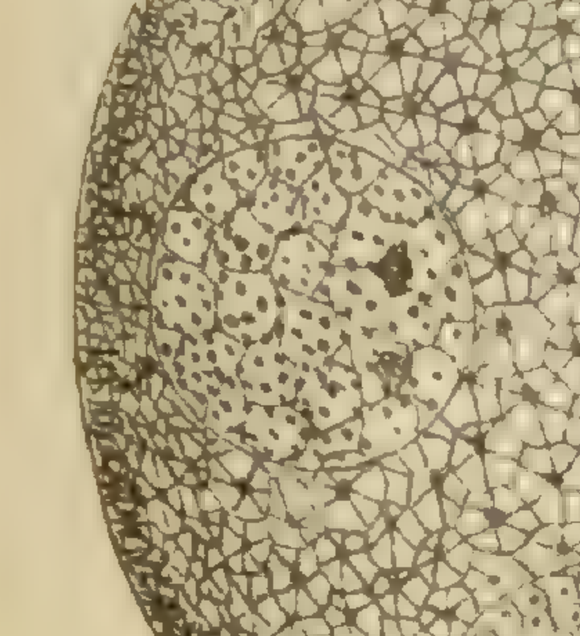

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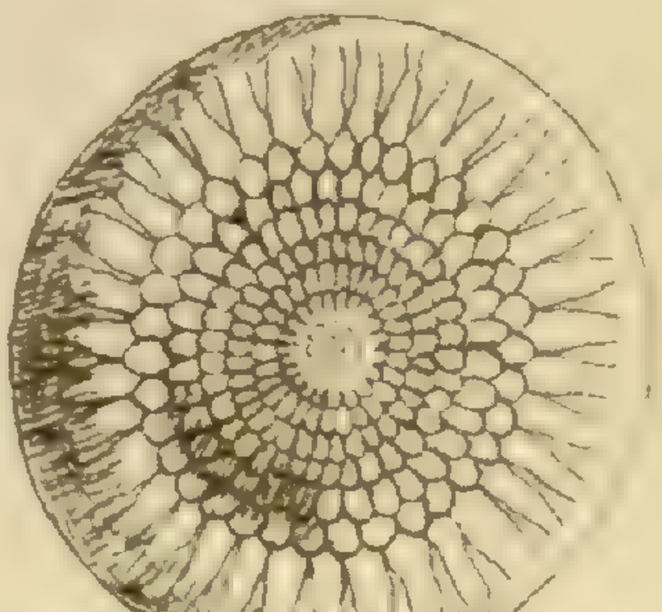


22 bis. d.

22 bis.

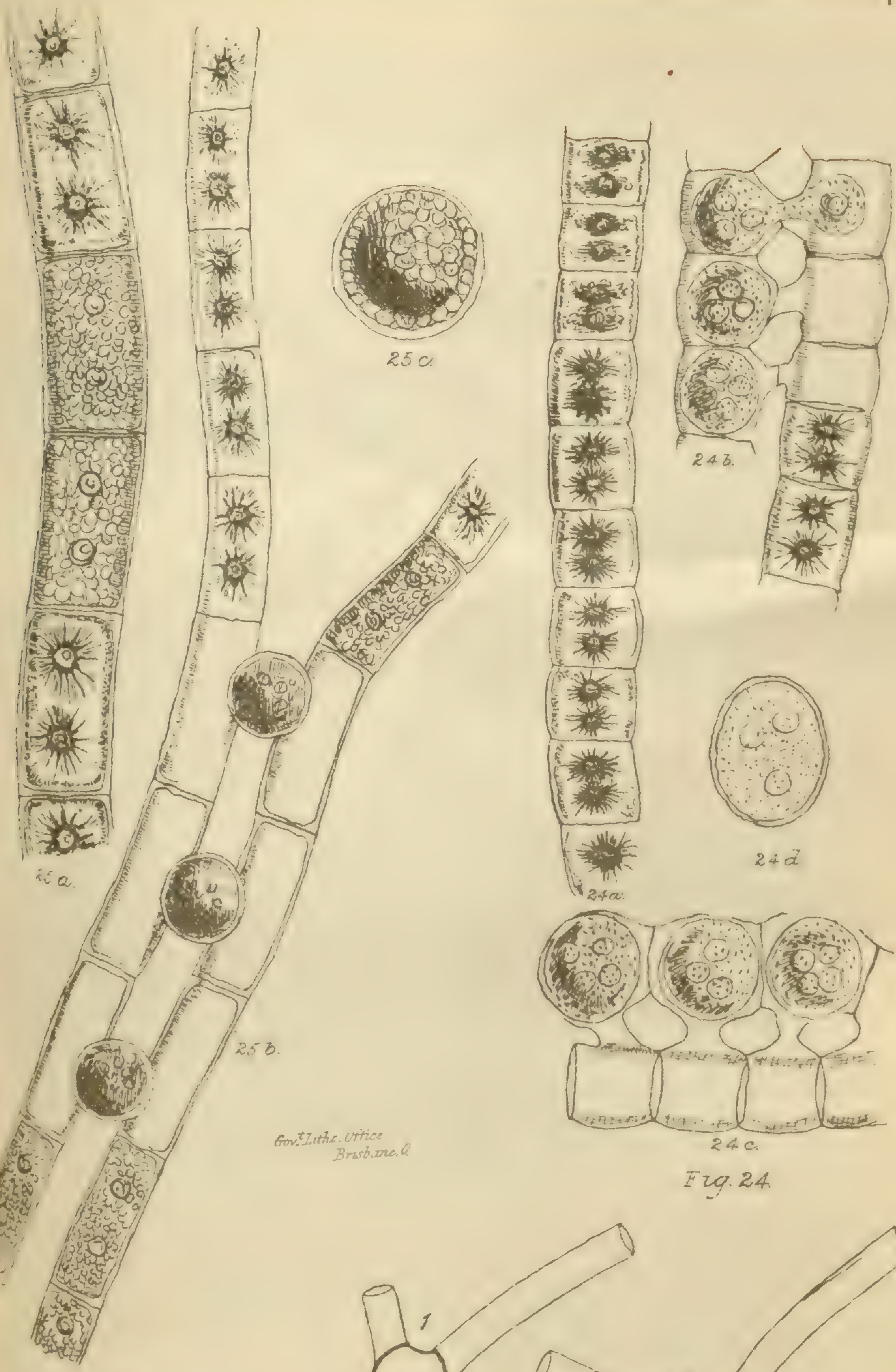
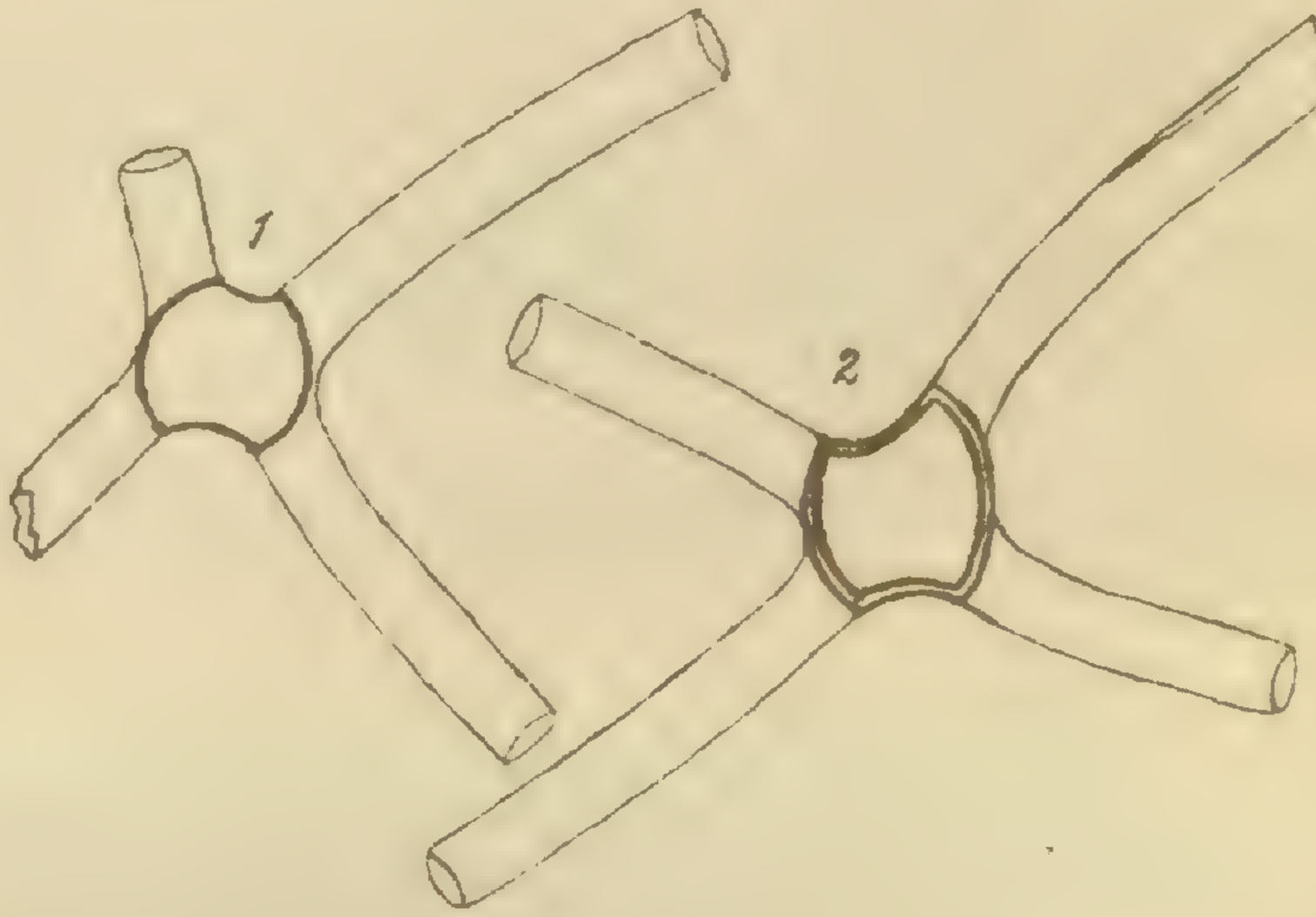


Fig. 24.

Fig. 25.



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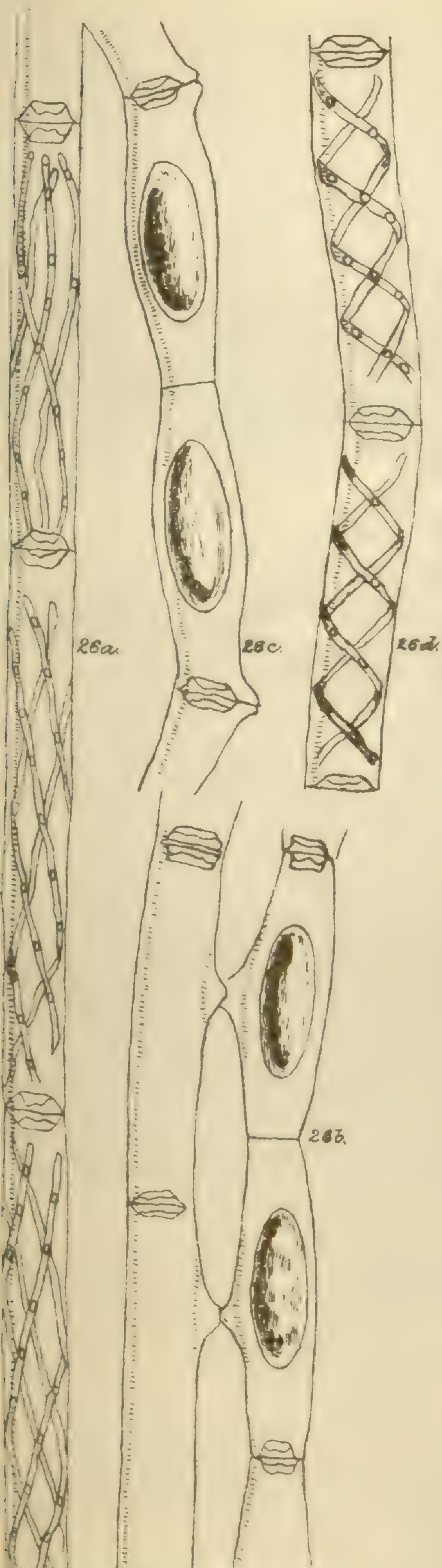

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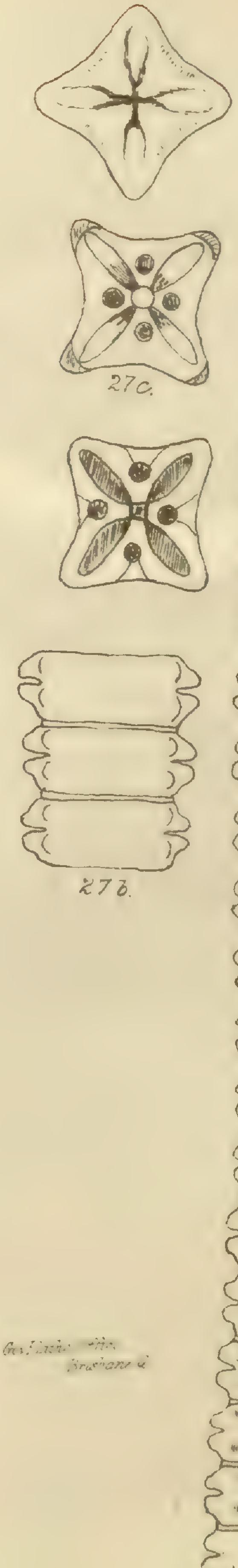


Fig. 27

Fig. 29.

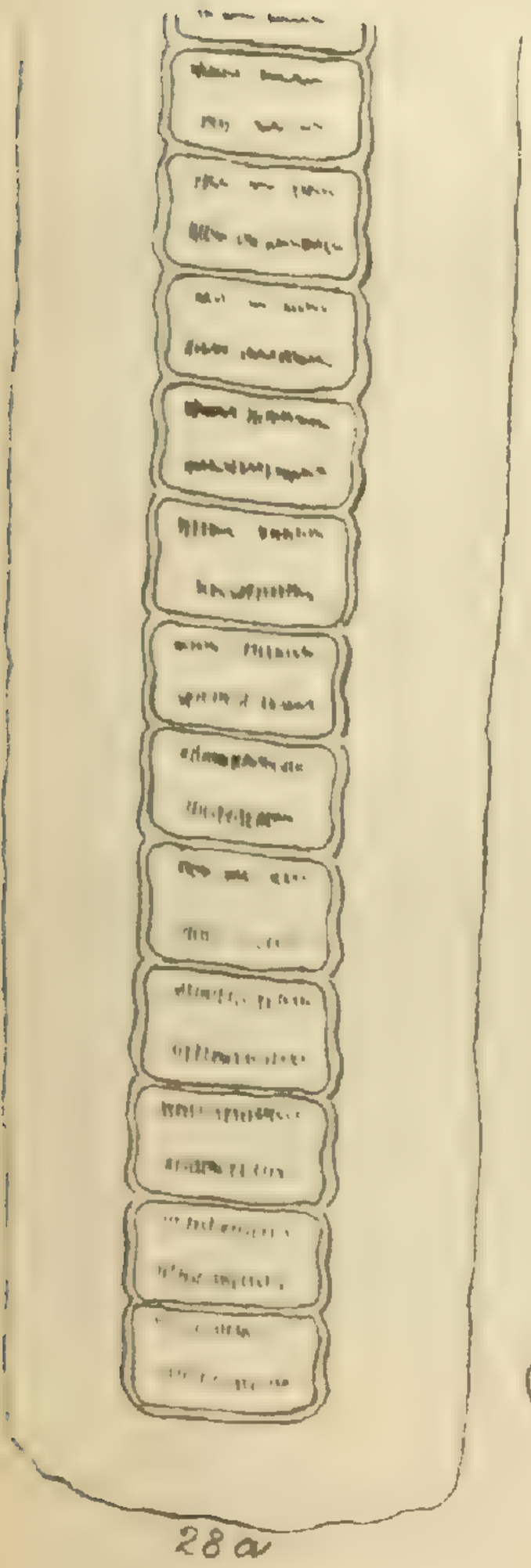


Fig 28.

Fig. 31.

Fig. 30.

38a

38b.

38c

Fig. 38.

34b.

34b.

34a.

Fig. 34.

Fig. 33.

Fig. 35.

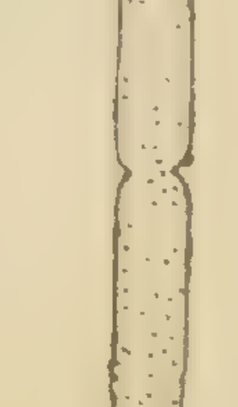
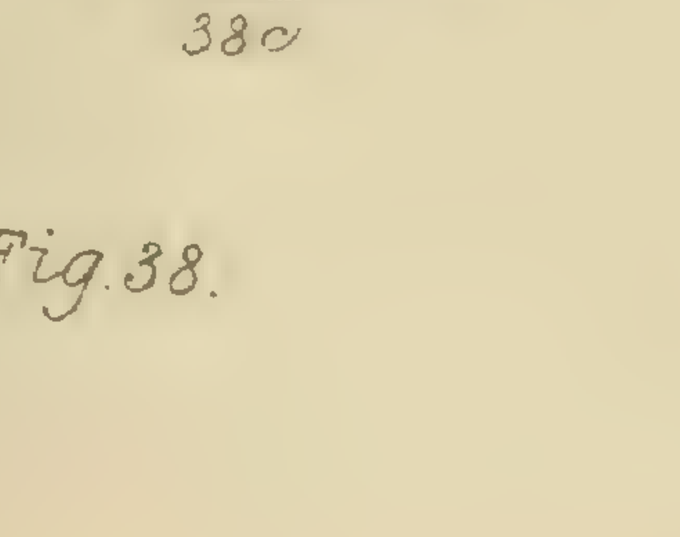


Fig. 36.

Fig. 32.



37a.

37b.

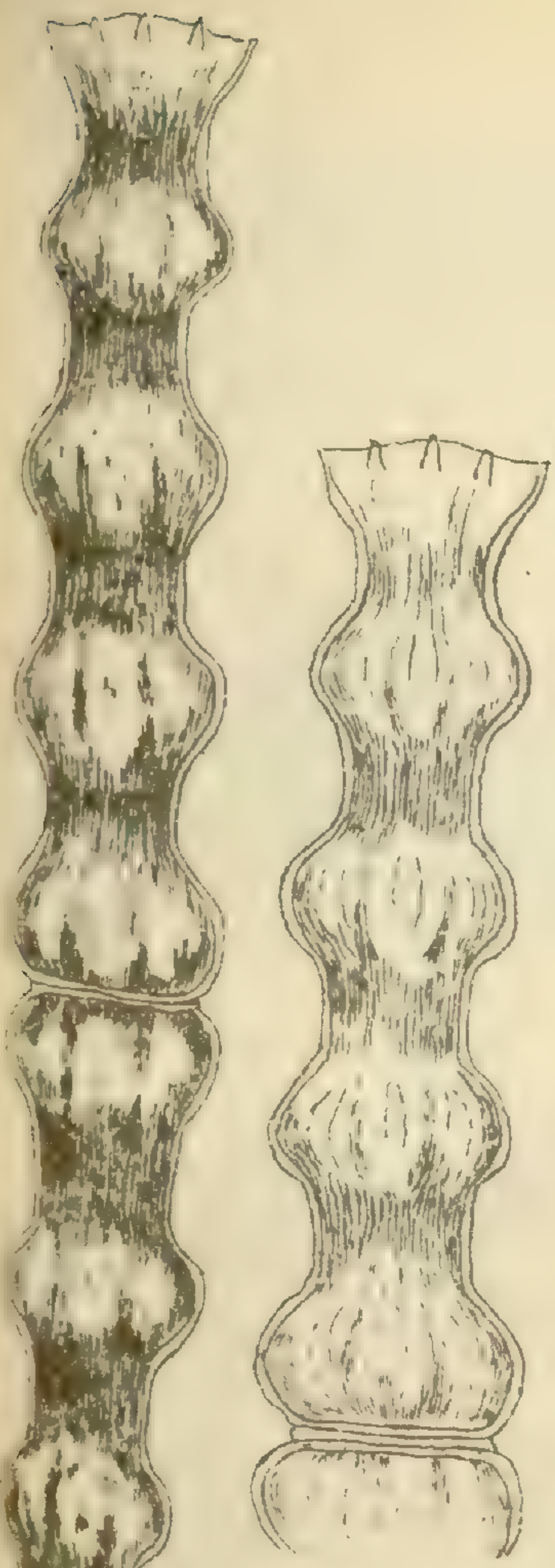
Fig. 37

33 bis. 3

33 bis. c

33 bis a

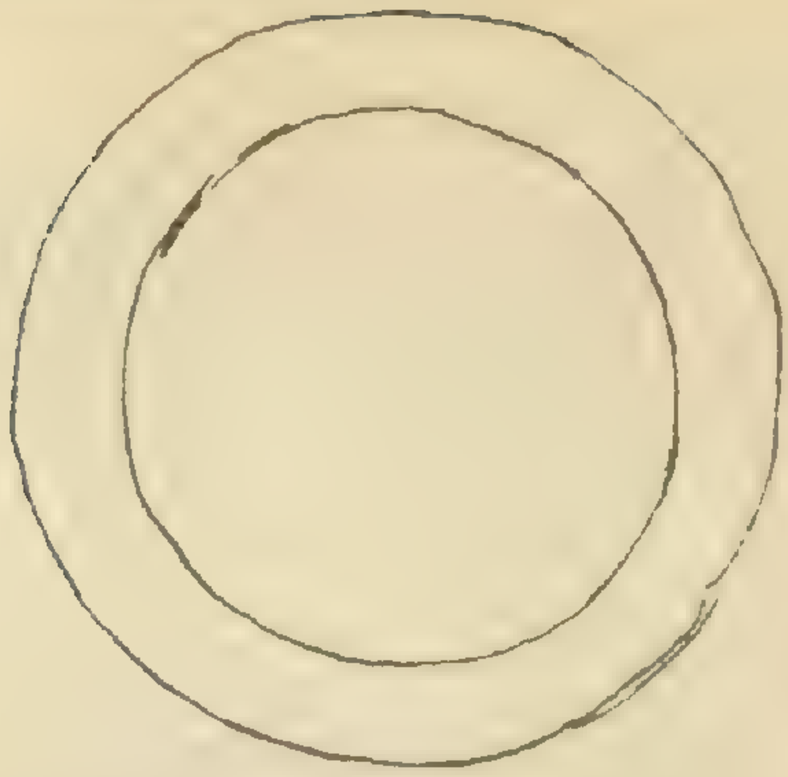
33 bis.



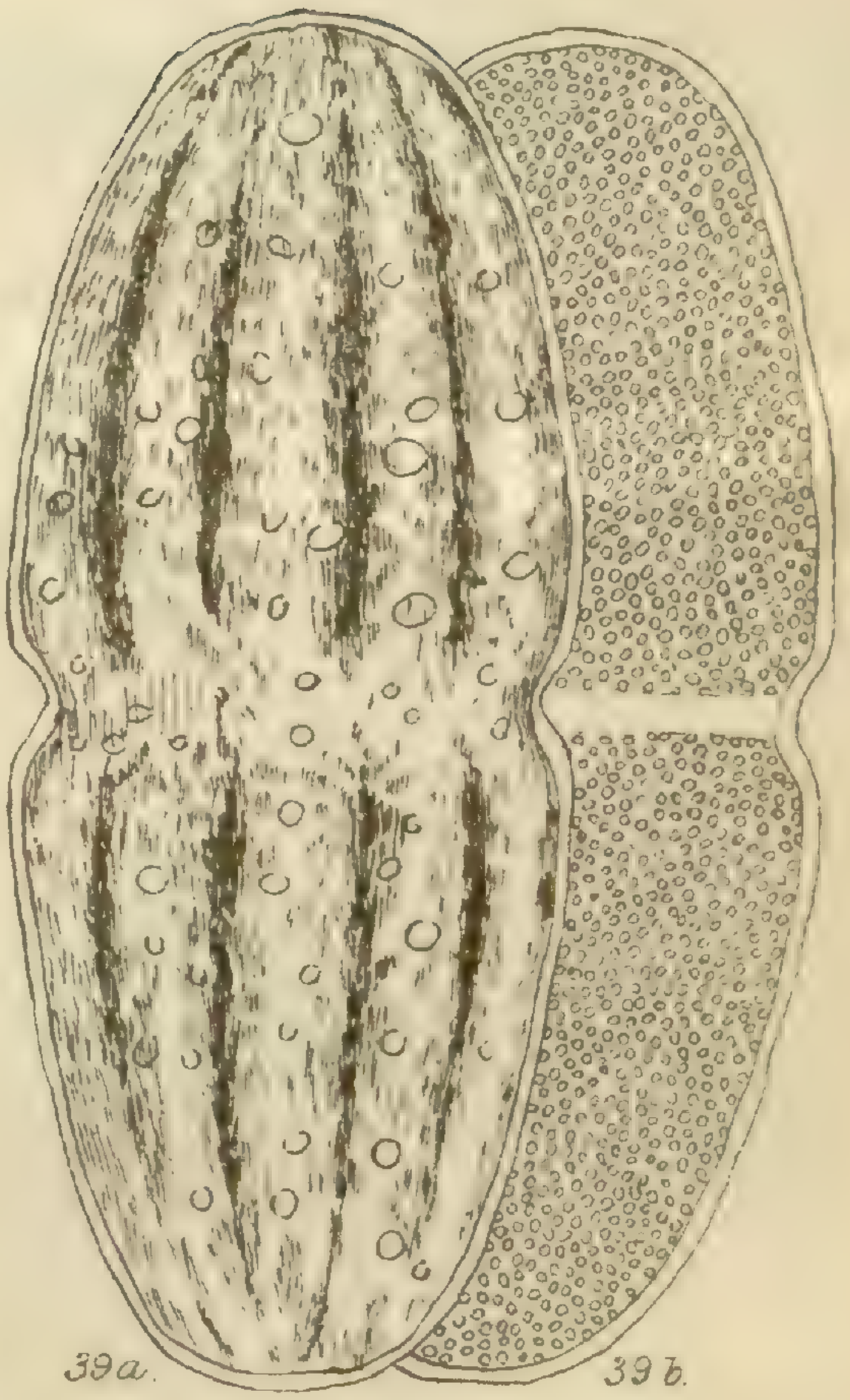
38 bis. b.

38 bis. a

38 bis.



39 c.



39 a. 39 b.

Fig. 39.

Fig. 39. bis.

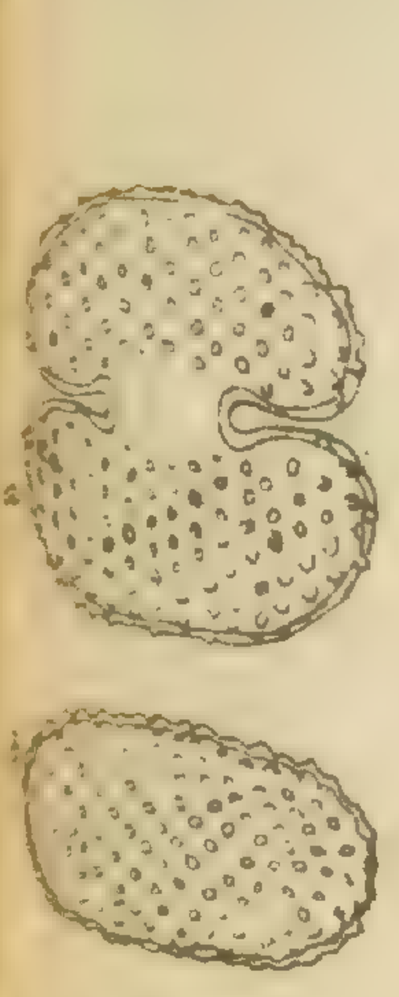
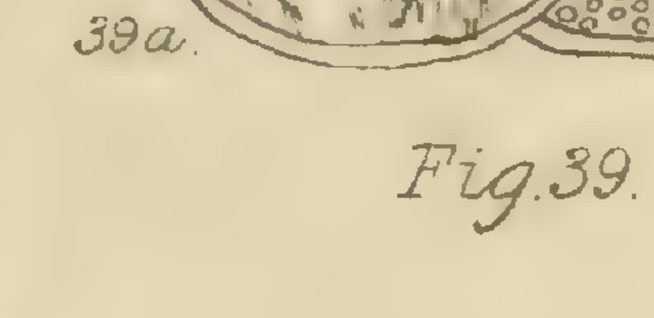


Fig. 42.



A. B. C.

Fig. 41

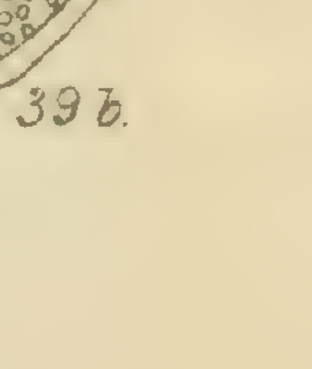
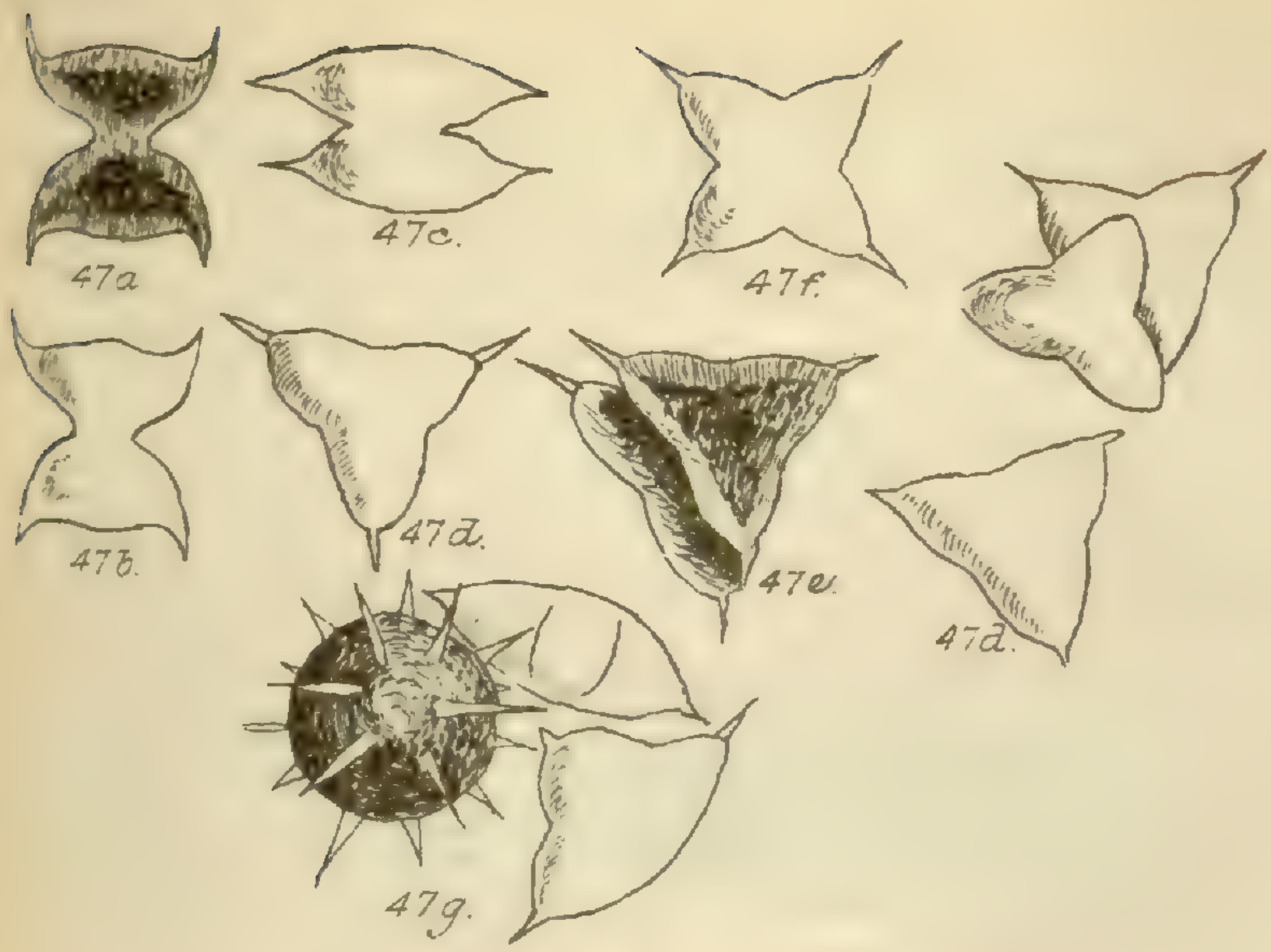


Fig. 40



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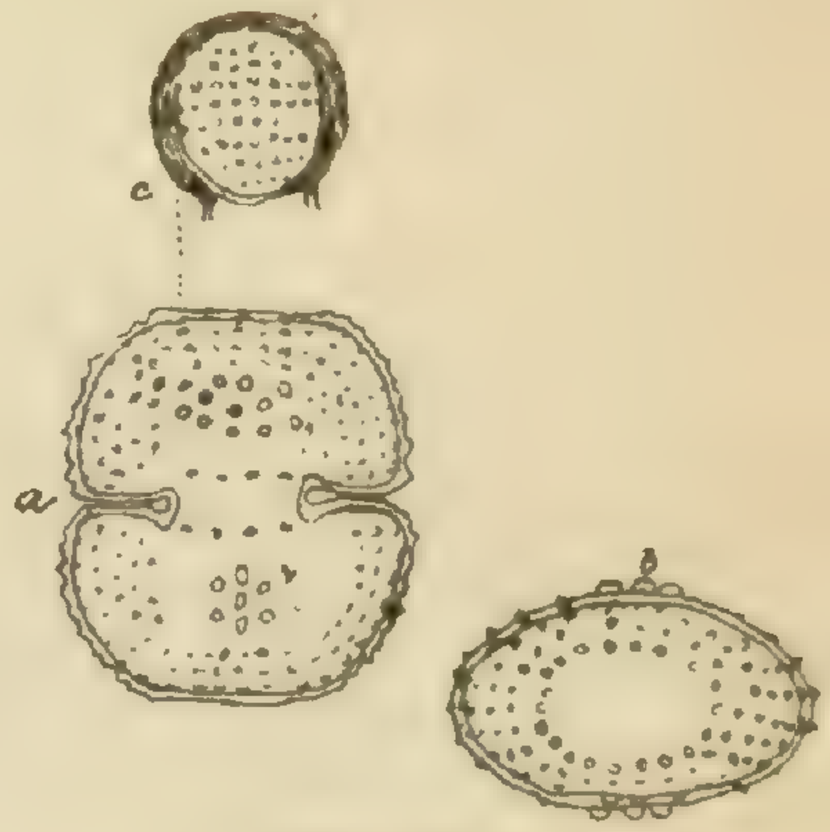


Fig. 43.

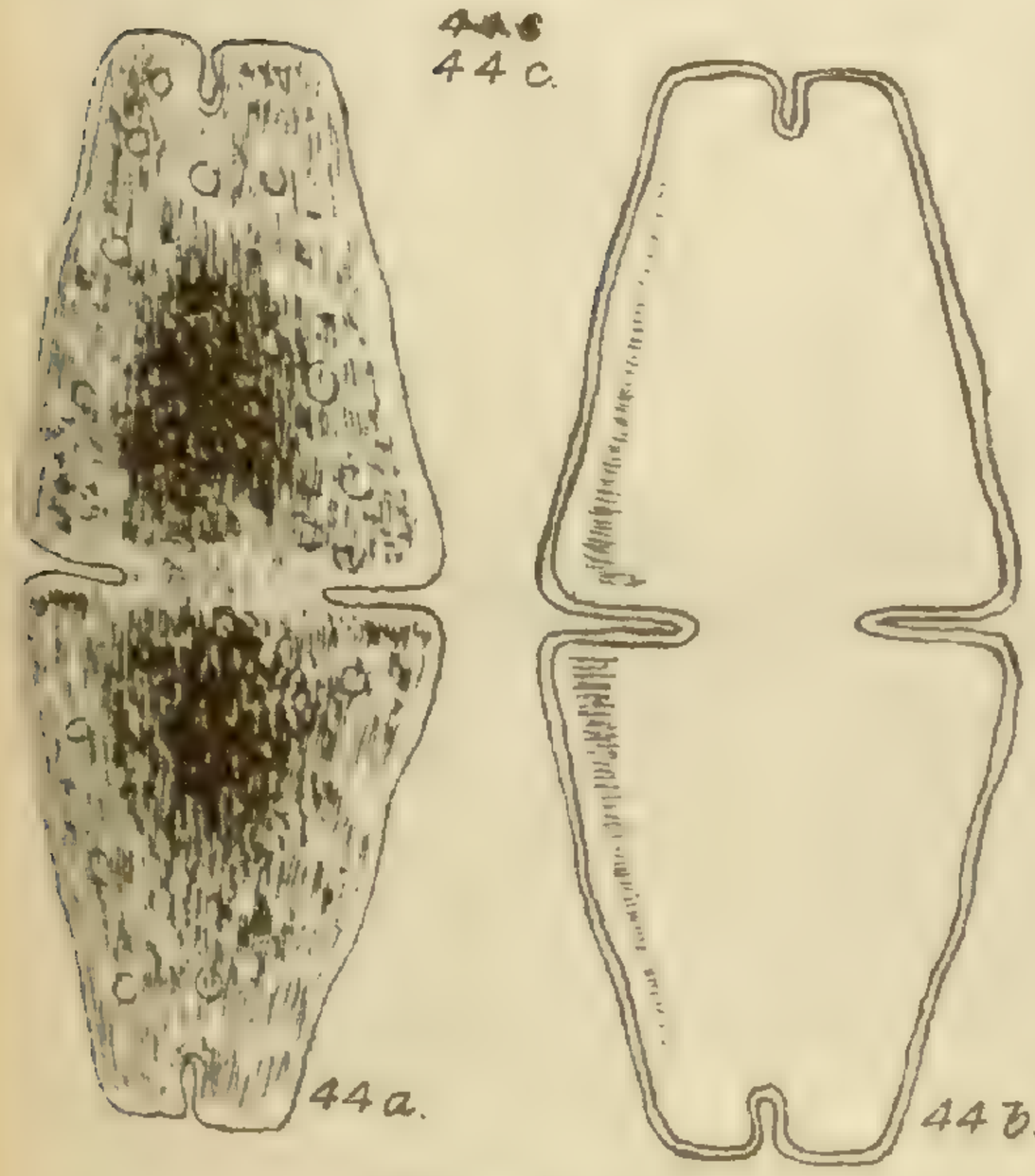


Fig. 44

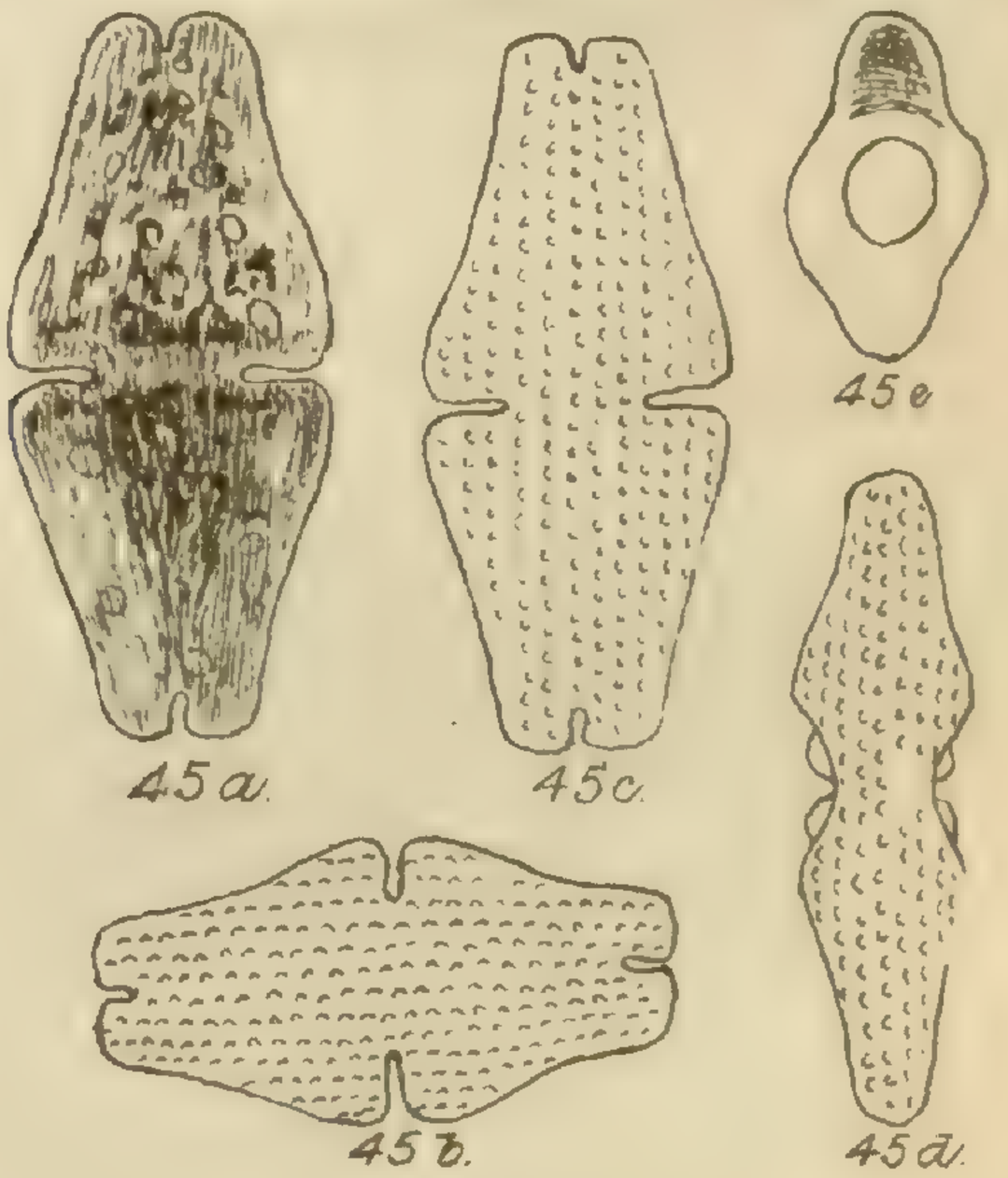
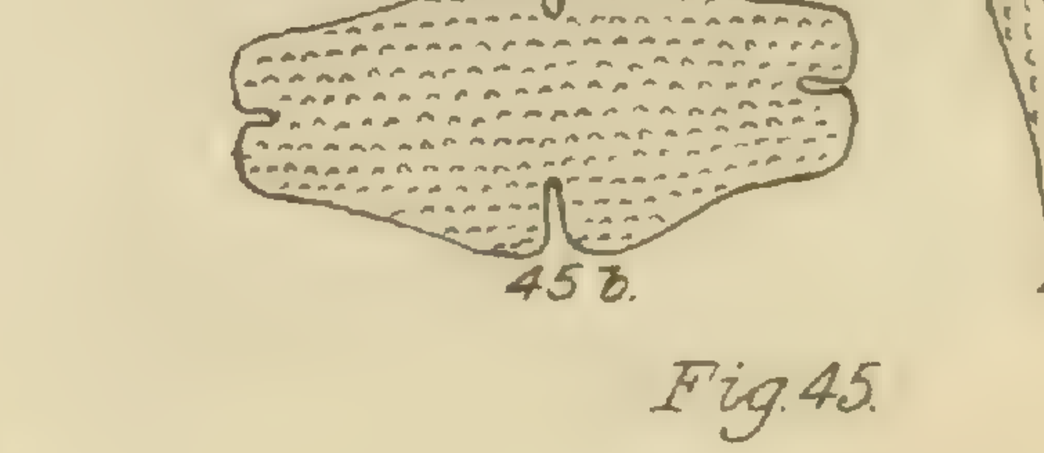


Fig. 45.

Fig. 48.



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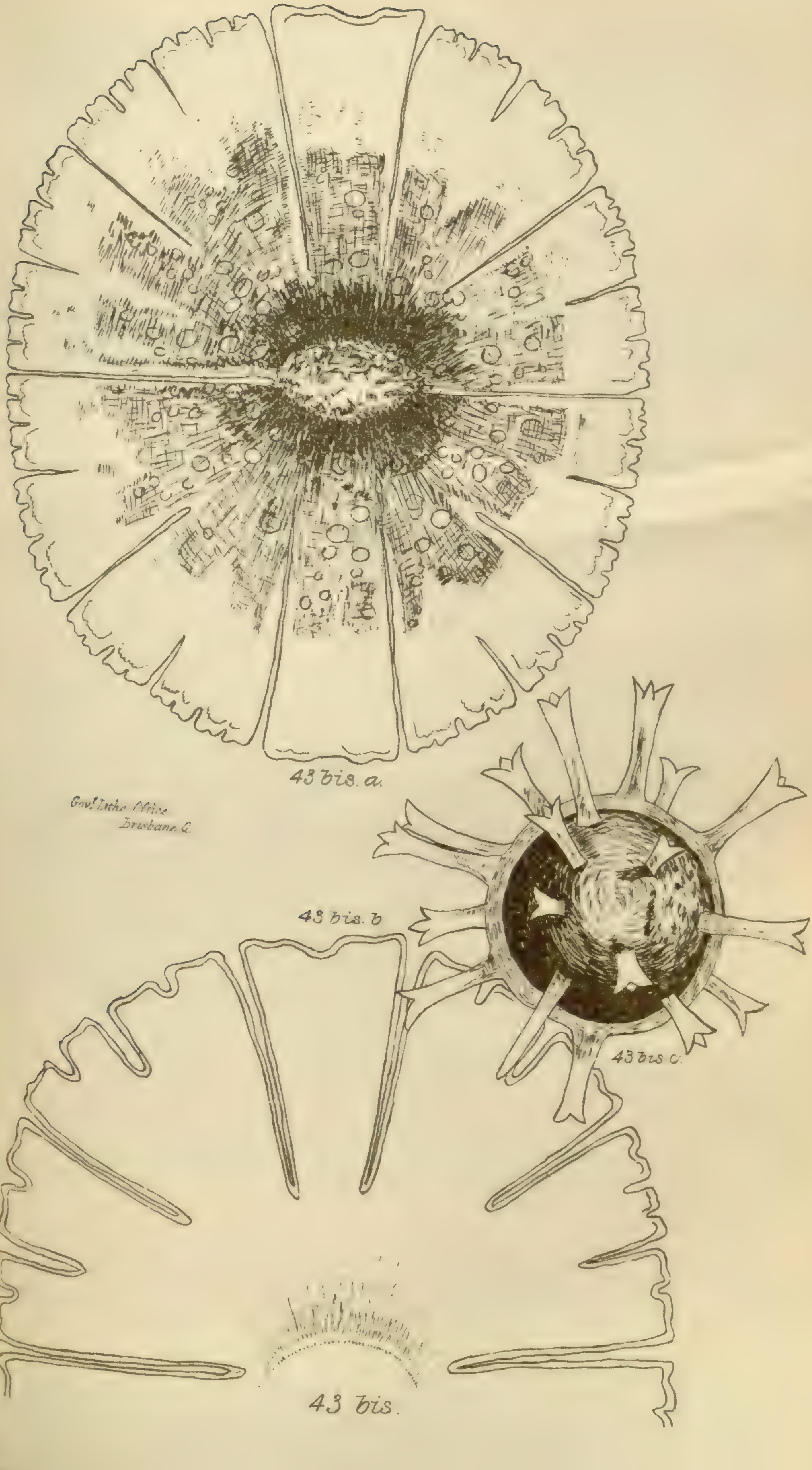
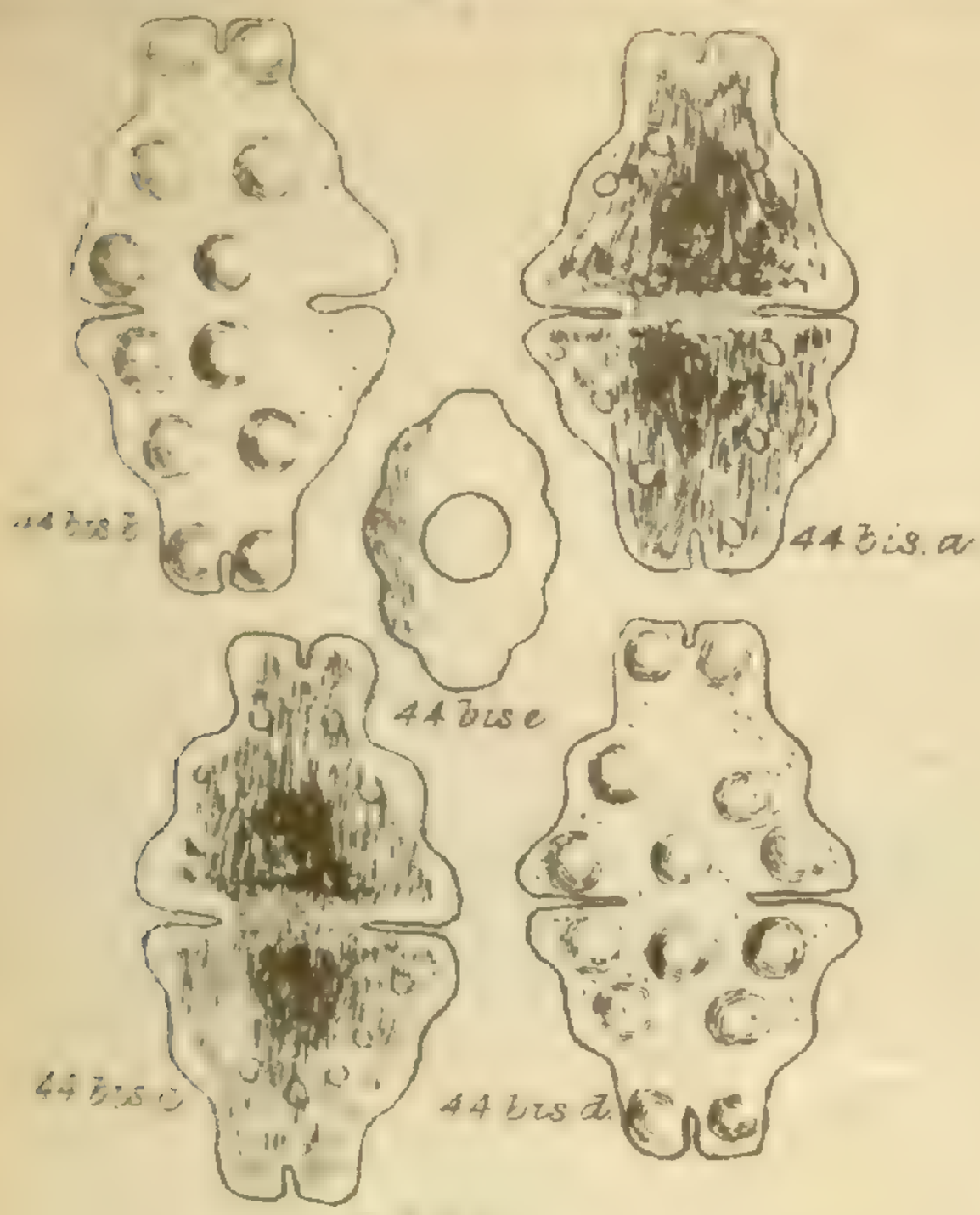


Gov.t Litho Office
Brisbane Q.

43 bis.



44 bis

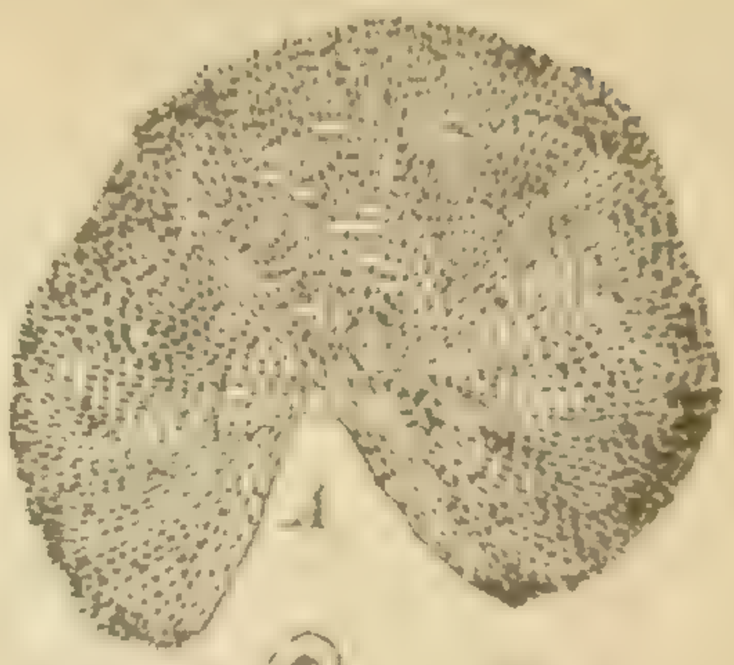


Fig. 49. bis.

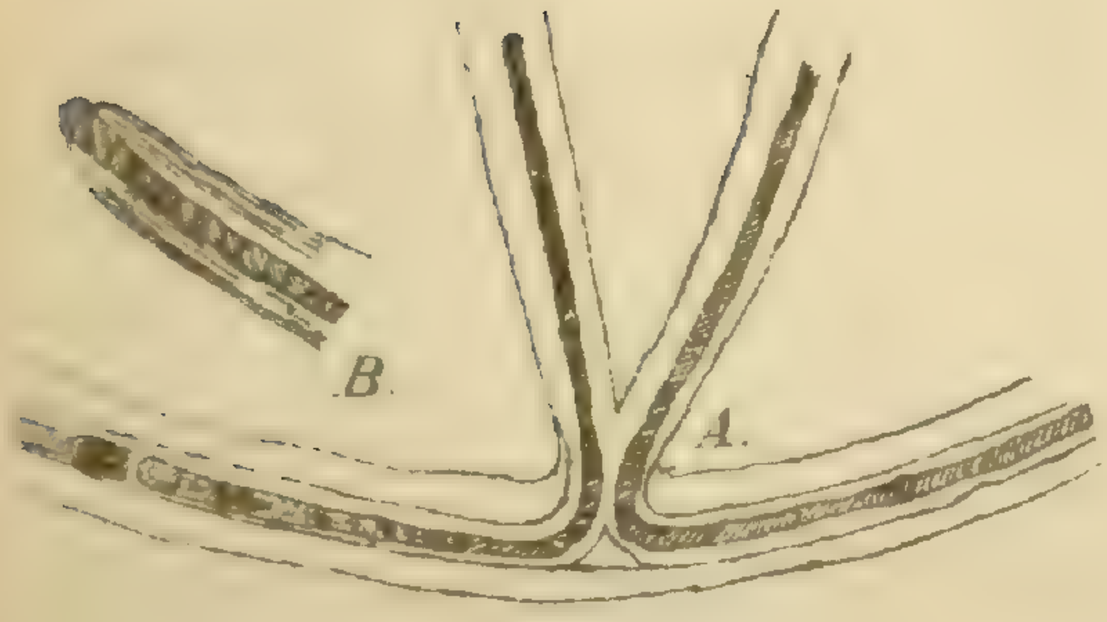


Fig. 50

50 bis.

Fig. 51.

Fig. 52.

Imp. Lith. Wirz
Brisbane. Q.

Fig. 52.

54 b

54 a

Fig. 54.

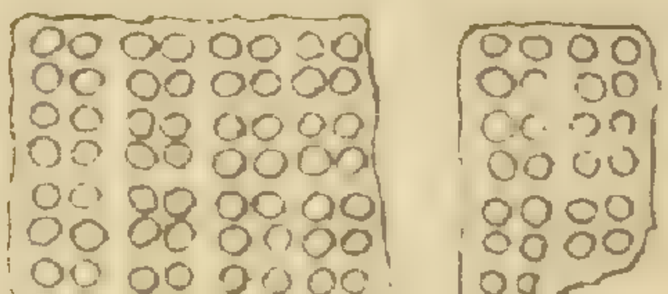


Fig. 53.

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BULLETIN No. 21.

FEBRUARY, 1893.

BOTANY BULLETIN No. VII.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

BY AUTHORITY: JAMES C. BEAL, GOVERNMENT PRINTER, WILLIAM STREET.

1893.

PREFATORY NOTICE.

The present Bulletin closes the record of additional Phanerogams and Vascular Cryptogams which have been added to the Queensland Flora during the year 1892. I also take the opportunity of thanking my numerous correspondents for their past exertions in the labour of collecting, and solicit a continuance of the same in the coming year 1893, for, while much has been done to develop the Colony's floral riches, still much remains to be accomplished before a full insight is obtained of the vast riches of our Queensland vegetation.

F. M. B.

December, 1892.

MISSOURI BOTANICAL GARDEN
NOV 3 1945
LIBRARY

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BOTANY:
CONTRIBUTIONS TO QUEENSLAND FLORA.

Order RANUNCULACEÆ.

Tribe CLEMATIDEÆ.

CLEMATIS, Linn.

C. aristata, var. longiseta (n. var.) A climber, glabrous except the young shoots and inflorescence. Leaves on long slender petioles, leaflets 3, ovate-lanceolate, attaining the length of about 2 in. and mostly under ½-in. broad at the base, where they slightly taper to the rather long petiolules, margins bordered by distant setaceous teeth. Flowers yellowish, tomentose, in short racemes in the axils of the leaves. Pedicels rather long and slender. Sepals 4, about 5 lines long, linear-lanceolate. Anthers often more ovate than oblong, and usually upon short filaments, the terminal awn frequently exceeding in length that of both anther and filament and often three times the length of the anther, and tapering to a hair-like point. Female flowers and achenes not collected.

Hab.: Upper Nerang, *H. Schneider*.

C. Fawcettii, *F. v. M.* The form of this plant at Killarney has beautiful purplish flowers, otherwise it fully agrees with Mueller's description in Fragm. x. 1. Here, however, the colour of flower is not recorded, but the flower in the Muellerian Herbarium, Melbourne, appears to be white.

Hab.: Killarney, October, 1891.

Order DILLENIACEÆ.

Tribe HIBBERTIEÆ.

HIBBERTIA, Andr.

Section Euhibbertia.

H. virgata, *R. Br.*; Flora Austr. i. 34. Diffuse or erect, glabrous, with numerous thin but stiff and often wiry branches. Leaves narrow-linear, obtuse or scarcely acute, mostly about ½-in. long but sometimes much longer, stiff and rather thick, the margins not revolute, and sometimes almost terete. Flowers sessile, surrounded by 2 or 3 very broad scarious pale-brown bracts, fully half as long as the calyx. Sepals about 4 lines long, obtuse or more frequently acute, or with a short sharp point, glabrous, and more scarious than in any other species. Petals broadly obovate, scarcely emarginate. Stamens 10 to 15 without staminodia. Carpels 3, glabrous, 2-ovulate.—*Benth. l.c.*

Hab.: Fraser Island, *Hon. Miss Lovell.*

Order CRUCIFERÆ.

Tribe BRASSICEÆ.

BRASSICA, Linn.

Sepals erect or spreading, lateral, usually saccate at the base. Pods elongated, terete or angular, often with an indehiscent 1-seed beak; valves convex, 1-3-nerved, lateral nerves flexuose; style beaked or ensiform; stigma truncate or 2-lobed. Seeds 1-seriate, globose or sub-compressed; cotyledons incumbent, concave or conduplicate, the radicle within the longitudinal fold. Glabrous or hispid herbs; root-stock often woody. Leaves large, pinnatifid or lyrate, rarely entire. Flowers yellow, in long racemes.

B. (Sinapis) lævigata, *Linn.* Smooth Mustard. Annual, plant 2 or 3 ft. high, smooth. Leaves stalked, lyrately-pinnate-parted; lobes acutely toothed, terminal one large, ovate; petioles not auricled at the base; upper leaves linear, almost entire.

Hab.: What seems the above European plant, or a form of it, has become a bad weed on some of the Darling Downs farms.

Order PITTOSPOREÆ.

CITRIOBATUS, A. Cunn.

C. lancifolia (n. sp.) A small tree, bark whitish, branchlets slender, and the smaller ones often terminating in sharp spines. Leaves alternate, lanceolate, membranous, about 1½ in. long, ½-in. broad, on very short slender petioles, the veins very oblique, looping far within the margin, delicately reticulate and dotted with guttate oil-cells, margins entire. Flowers axillary or lateral, solitary or in pairs, on very short peduncles, bracts minute. Sepals 5, linear, recurved. Petals 5, linear, more or less imbricate, cohering in a tube of nearly their whole length. Stamens 5, shorter than the petals and opposite them; filaments flattened but tapering towards the anther which is sagittate, free with 2 cell-slits the length of the anther. Style glabrous, stigma truncate or very shortly and obtusely lobed; ovary silky-hairy, seems to be 1-celled, superior. Fruit a berry, nearly globose, about 5 lines in diameter, with a thin coriaceous pericarp. Seeds 9 in the fruits opened, enveloped in a viscous fluid, somewhat reniform, flattened, dark-brown.

Hab.: Killarney, on border of scrub, in flower. Warwick fruit specimen, *C. J. Gwyther.*

Order RUTACEÆ.

Tribe ZANTHOXYLEÆ.

ZANTHOXYLUM, Linn.

Z. veneficum, *Bail.* Panicles terminal or a few smaller ones in the upper axils. Flowers small, in threes or fours at the ends of the branchlets on short pedicels; buds globose. Sepals 4, about ½-line in diameter. Petals 4, ovate patent, 2½ lines long, imbricate in the bud. Filaments 4, flattened, longer than the petals, arching over the ovary and the anthers connivent. Anthers rather large and somewhat cordate. Ovary with 8 prominent wing-like angles. Stigma sessile.

Hab.: Barron River, *E. Cowley.*

Order LEGUMINOSÆ.

Tribe CASSIEÆ.

CASSIA, Linn.

C. alata, *Linn.* A shrub attaining the height of 8 to 10 ft., glabrous or subglabrous, the stipules deltoid, persistent. Leaves 1 to 2 ft. long, rhachis acutely margined above when dry, glandular, with a prominent transverse ridge connecting the opposite leaflets. Leaflets in 9 to 12 pairs, oblong, obtuse, 2 to 6 in. long, minutely mucronate, rigidly subcoriaceous, with an oblique truncate base, subsessile or petiolulate. Racemes pedunculate, ½ to 1 ft. long; bracts large, membranous, ½ to 1 in. long, caducous, coloured, imbricate at first. Sepals coloured, membranous. Corolla yellow, veined. Stamens very unequal, the two anterior ones with enlarged strongly curved anthers. Pod membranous, linear, apiculate, 5 or 6 in. long, about ½-in. broad, each valve with a very prominent crenate longitudinal wing extending the entire length of the valve. Seeds about 50, rhomboid-cuneate.

Hab.: This widely spread tropical shrub has of late years become naturalised in the Barron River district. *E. Cowley.*

Tribe ACACIEÆ.

ACACIA, Willd.

A. Maideni, *F. v. M.*, Vict. Nat. 1892. Arborescent; branchlets somewhat angular towards the summit; phyllodes large, of chartaceous texture, lanceolar-falcate, gradually narrowed into the petiole, very closely striolated by fine longitudinal venules with some few of these more prominent, almost glabrous or slightly greyish from hardly visible hairlets; marginal glandule near the anterior base of the phyllodes inconspicuous; spikes almost sessile, solitary or 2 or 3 together, their rachis tomentellous; calyx broader than long, much shorter than the corolla, short-lobed, subtle-pubescent; corolla almost glabrous, deeply cleft into usually 4 lobes, not streaked; fruit narrow, considerably compressed, much twisted, outside beset with minute hairlets; seed placed longitudinally, ovate-ellipsoid, shining-black, their areole on each side large; funicle pale-reddish, completely or extensively encircling the seed, suddenly doubled back from the summit, folded at the lower side.

Hab.: Near the Karuak River, *W. Bauerlen;* Mooloolah River, *Eaves;* Richmond River, *Mrs. Hodgkinson.*

This species seems to occur in several other places of Northern New South Wales and Southern Queensland, but fruit-specimens, confirmatory of its characteristics, are extant as yet in our collections only from the three above-mentioned places. Nearest to *A. glaucescens. F. v. M. l.c.*

Order DROSERACEÆ.

DROSERA, Linn.

Section Rorella.

D. Lovellæ. (After the discoverer, the Hon. Miss Lovell.) A small deep-red plant. Leaves rosulate, spathulate, 3 lines long, and about 1¼ line broad at the end, and from whence it narrows to a broad flat petiole, the lamina bearing near the margin a deep-red fringe which does not extend to the petiole, which is glabrous. Stipules scarious,

deeply cut into narrow lobes. Scapes 1 to 1½ in. high, reddish, slightly glandular, with a few longer white hairs, flattened and with a longitudinal centre groove, bearing at the end 3 flowers on short pedicels. Sepals tinted with red, about ¾-line long. Petals white, about 1½ line long; the stamens only about half that length. Anthers nearly globular. Styles 4, slightly club-shaped and stigmatic at the end as in *D. pygmæa*. Capsule 4-valved, but only an old one seen.

Hab.: Fraser Island, *Hon. Miss S. Lovell*, a resident on the island who takes a deep interest in botany.

D. pygmæa, *DC.*, Prod.; *Benth.*, Flora Austr. ii. 457. A minute species said to be annual, but evidently forming a hybernating bud in the centre of the rosette like the other species of the section. Leaves rosulate, orbicular, ½ to nearly 1 line diameter, on slender petioles, forming tufts of about ½-in. diameter. Stipules scarious (silvery), deeply lobed. Scapes glabrous, filiform, ½ to nearly 1 in. high, bearing a single minute terminal flower. Sepals 4, about ⅓-line long in flower, nearly 1 line in fruit. Petals rather large. Styles 4, slightly club-shaped and stigmatic at the end. Capsule 4-valved. Seeds few, rather large in proportion, ovoid.—*Benth. l.c.*

Hab.: Fraser Island, *Hon. Miss Lovell.*

Order **MYRTACEÆ.**

Tribe MYRTEÆ.

RHODAMNIA, Jack.

R. trinervia, var. spongiosa (n. var.) This Northern tree differs from the ordinary forms met with, in being glabrous except the inflorescence, and in the smaller branches bearing a more or less thick, white, spongy clothing. In an early stage of growth this is covered by a reddish brittle bark, but this cracks off early, exposing the spongy matter.

Hab.: Tringilburra Creek, *Bellenden-Ker Expedition.* Barron River, *E. Cowley.*

Order **LYTHRARIEÆ.**

Tribe AMMANNIEÆ.

PEPLIS, Linn.

Calyx campanulate, with 6 rarely 5 external and 6 internal smaller teeth. Petals 6 rarely 5, inserted at the throat of the calyx, very fugacious or none. Stamens 6 rarely 5, inserted in the middle of the calyx-tube; filaments short, anthers didymous. Ovary subglobose. membranous, 2-celled, included in the calyx. Style very short. Capsule 2-celled, 2-valved or bursting irregularly. Seeds numerous. minute, obovate, plano-convex. Herbs with alternate or opposite, obovate or linear-oblong, entire leaves, and axillary, sessile, solitary. small, 2-bracteolate flowers.

P. portula, *Linn.* Water Purslane. A slightly branched creeping plant, with obovate or oblong leaves. Flowers sessile in the axils of nearly all the leaves. Capsule enclosed in the somewhat enlarged calyx, but seldom attaining a line in diameter.

Hab.: A common European plant found in wet situations; has become naturalised in many Queensland bush-houses.

Order CUCURBITACEÆ.

Tribe CUCUMERINEÆ.

ECBALLIUM, A. Rich.

Flowers monœcious. Male racemose. Calyx-tube short, campanulate, the limb 5-fid. Corolla subrotund or broadly campanulate, deeply 5-lobed, with oblong acute segments. Stamens 3; filaments short, free; anthers broad, one 1-celled, the others 2-celled, the cells flexuose, connective marginal. Female flowers solitary, pedunculate. Calyx above the ovary and corolla of the males. Stamens 3, imperfect. Ovary oblong, hispid, placentas 3; style short, dilated in three 2-furcate and recurved-subulate stigmatose branches. Fruit oblong, hispid-echinate, very juicy, when mature separating from top of articulate peduncle and elastically projecting seeds with juice from basal aperture. Seeds numerous, oblong, compressed, short or narrowly marginate, crowned at apex with short duplex aril of hilum and micropyle.

E. Elaterium, *A. Rich.* The Squirting Cucumber. A perennial or annual herb, creeping, fleshy, everywhere hispid-pilose. Leaves alternate, long-petiolate, cordate, obtuse, without tendrils. Flowers yellow, lateral, the female sometimes in the same axil with the male raceme, but usually in separate ones.

Hab.: A Mediterranean plant lately become naturalised along the banks of the Condamine, whence specimens have been brought to Brisbane by Professor E. M. Shelton.

Order UMBELLIFERÆ.

Tribe CAUCALINEÆ.

CORIANDRUM, Linn.

Calyx-teeth small, acute, often unequal. Petals obovate, emarginate, white or purplish, of the outer flowers unequal, often radiant. Fruit subglobose; ridges not prominent, dorsal primary and adjacent secondary strongest, lateral primary and secondary obscure; vittæ obscure, solitary, under the secondary ridges; carpels slightly concave on the inner face, commissure distinctly 2-vittate, carpophore 2-partite. Seed convexo-concave, about thrice as broad as thick. Annual herbs.

C. sativa, *Linn.* The Common Coriander. An erect branching glabrous annual, 1 to 1½ ft. high, emitting a very disagreeable smell when rubbed. Lowest leaves once or twice pinnate, with broadly ovate or cuneate, deeply-cut segments; the others more divided, with linear segments, few and slender in the uppermost leaves. Umbels terminal, rather small, of 5 to 8 rays, without general involucre, and only a few small slender bracts to the partial ones. Flowers white, the outer petals larger. Fruits about 2 lines long.

Hab.: A native of the Levant, long since cultivated in Europe, and spreading as a weed of cultivation. It is often met with in the pastures about Brisbane as a stray from cultivation.

Order RUBIACEÆ.

Tribe GARDENIEÆ.

GARDENIA, Linn.

G. ovularis (n. sp.) (Name suggestive of form of fruit, which in size and shape resembles a pigeon's egg.) A small tree, quite glabrous except for the tufts of hairs in the axils of the primary nerves of the leaves, the young shoots resinous; bark smooth, wood light-coloured and close in grain. Leaves glossy on both sides, lanceolate, 5 to 9 in. long, and from 1½ to 3 in. broad in the middle, the midrib and primary parallel nerves alone prominent, texture membranous, petioles ¼ to ½ in. long. Flowers terminal, rarely in the upper axils, solitary but sometimes appearing as if 3, the upper pairs of leaves being wanting, the stipules then appearing as bracts upon an elongated peduncle, 6-merous. Peduncle ½-in. or less. Calyx-tube slightly ribbed, 2 or 3 lines long; teeth 5 lines long, narrow-linear. Corolla white, tube dilated upwards, from 1 to 1¼ in. long; lobes oblong, about ¾-in. long. Anthers 4-angled, ½-in. long. Style included in all the flowers examined, with short connivent stigmatic lobes. Fruit oval, 1¼ in. long, smooth, crowned by the free part of the calyx-tube, placentas 3. The outer shell or pericarp very thin and marked with 9 or more faint ribs.

Hab.: Johnstone River, *Dr. T. L. Bancroft.* Barron River, *E. Cowley.*

A log of Dr. Bancroft's tree was worked for the Queensland wood exhibit at the Centennial International Exhibition, Melbourne, 1888, and given in the Woods Catalogue as a doubtful variety of *G. Macgillivrai*, No. 242A, the fruit then being unknown.

Tribe SPERMACOCEÆ.

RICHARDSONIA, Kunth.

Flowers hermaphrodite in terminal heads. Involucre 4-leaved. Calyx-tube turbinate or subglobose, limb of from 4 to 8 lanceolate or subulate segments. Corolla infundibuliform, glabrous at the throat; lobes 3 to 5, ovate or lanceolate, valvate. Stamens 3 to 5, inserted in the throat of the corolla; filaments filiform. Anthers linear or oblong, exserted. Disk inconspicuous. Ovary 3-4-celled; style filiform, with 3 or 4 linear branches. Capsule 3 or 4-coccous; cocci indehiscent, furrowed on the inner side, at length concrete with the seed.

R. scabra, *Linn.* (*sub Richardia*). Stems pilose; leaves lanceolate-oblong or elliptical, stipular bristles as long as or shorter than their sheaths. Flowers many in each head. Calyx-lobes 6, foliaceous, ovate-deltoid, as long as the truncate-obovate, muricate, 3 or 4 carpels.

Hab.: This West Indian plant has now become naturalised about the Barron River. *E. Cowley.*

Order COMPOSITÆ.

Tribe CICHORIACEÆ.

HYPOCHÆRIS, Linn.

H. glabra, *Linn.*; Flora Austr. iii. 677. A glabrous annual Leaves all radical, narrow, spreading, more or less toothed or pinnately lobed. Stem 6 to 12 in. high, usually divided into a few slender

branches, leafless except small scales at the base of the branches. Flower-heads solitary at the ends of the branches. Involucre cylindrical, at first small, but lengthening out to from $\frac{1}{2}$ to $\frac{3}{4}$ in. when in fruit, of a few imbricated bracts, the outer ones short and appressed. Achene striate and transversely pitted, the pappus of the outer ones sessile, that of the others borne on a long beak terminating the achene.—*Benth. l.c.*

Hab.: Naturalised in many parts of Southern Queensland.

Order APOCYNACEÆ.

Tribe PLUMERIEÆ.

OCHROSIA, Juss.

O. McDowalliana. Branches dark-coloured, lenticellate. Leaves mostly in whorls of 4, almost cuneate in outline, 3 to 5 in. long, very obtuse, almost emarginate, tapering to a petiole of about 1 in., coriaceous, dark-green, the transverse veins numerous, parallel. Flowers shortly pedicellate, loose trichotomous pedunculate cymes, terminal. Calyx-segments ovate, scarcely a line long. Corolla-tube slender, about 2 lines long, somewhat swollen about the centre over the anthers. Corolla-lobes linear-oblong, about as long as the tube, much overlapping, glabrous inside except for the ring of hairs about the attachment of the stamens. Anthers lanceolate-acute, with an inflexed shortly bilobed base. Hypogynous glands wanting in the flowers examined. Drupes reddish, oblong, without angles, $2\frac{1}{2}$ in. long, $1\frac{3}{4}$ to 2 in. diameter; sarcocarp yellow, endocarp deeply tuberculate.

Hab.: This is a tree growing in Wickham Terrace Reserve. Mr. R. McDowall tells me it was brought from either near Cairns or the Bellenden-Ker Ranges by Mr. Walter Hill. It differs from our Queensland form of *O. elliptica* in the foliage being more obtuse, and the more ample inflorescence, but I find the most marked distinction to be in the fruit. In *O. elliptica* the fruit is more highly coloured outside, more or less compressed, the apex pointed, and when dry almost surrounded by a more or less prominent thick wing; the sarcocarp also is pure white when fresh, not yellow. The nearest ally of our plant is *O. Kilneri*, F. v. M., with which it may prove identical. The species of this genus are not all clearly defined; I have, therefore, some hesitation in describing the present species as new. I cannot, however, place it under any of the species of which descriptions are to hand. Mr. McDowall has taken great trouble to furnish me with the specimens from which the above description has been drawn up, and the account of the history of the plant he has grown.

Tribe ECHITIDEÆ.

WRIGHTIA, R. Br.

W. Millgar (n. sp.) Native name "Millgar." A tree about 80 ft. high, glabrous except the inflorescence, with a smooth thin grey bark, thickly dotted with raised lenticelle, exuding a quantity of milky sap which inspissates into a substance resembling gutta-percha. Branchlets opposite. Leaves on petioles of from $\frac{1}{4}$ to $\frac{1}{2}$ in. long, ovate to ovate-lanceolate, with a more or less acuminate point, 2 to 4 in. long, $1\frac{1}{4}$ to $1\frac{1}{2}$ in. broad, venation prominent, the primary veins distant and looping near the margin. Flowers pedicellate, of a pale-yellow colour, in terminal puberulent cymes, shorter than the leaves. Calyx-teeth

short and rather blunt. Corolla-tube slightly exceeding the calyx and with a slight contraction at the throat; lobes ovate, 3 or 4 lines long. Corona of numerous filiform scales like that of a passion-flower and $\frac{3}{4}$ the length of the corolla-lobes. Anthers white, pubescent on the back, forming an elongated cone. Follicles 10 in. long, and very rough with tubercles, and showing several longitudinal lines. Seeds angular, tapering towards each end, often exceeding $\frac{3}{4}$-in. long, glabrous and pale-coloured; coma silky, white, exceeding 2 in. in length, and beautifully curved.

Hab.: Barron River, *E. Cowley*.

This new species of *Wrightia* in many respects approaches *W. tomentosa*, differing in the want of indumentum and form of corona, &c. The follicles closely resemble Wight's figures of *W. coccinea*, and the corona that of *W. tinctoria*.

Order LABIATÆ.

Tribe PROSTANTHEREÆ.

PROSTANTHERA, R. Br.

P. linearis, *R. Br.*; Flora Austr. v. 100. A tall erect shrub, glabrous or slightly pubescent. Leaves nearly sessile, linear, obtuse, entire, the margins more or less revolute in drying, $\frac{1}{2}$-in. to above 1 in. long, the upper floral ones similar but smaller. Flowers all axillary, but the upper ones sometimes forming terminal interrupted leafy racemes. Pedicels short; bracts small, filiform, calyx glabrous or slightly pubescent, about 2 lines long or longer when in fruit, the lips not very broad, nearly equal, entire, without any or only a very slight trace of the transverse downy line of the closely allied species. Corolla sprinkled with a few hairs.

Hab.: Wellington Point, *J. Wedd*.

Order PROTEACEÆ.

Tribe GREVILLEEÆ.

HELICIA, Lour.

H. australasica, *F. v. M.*, Flora Austr. v. 405. A small glabrous tree. Leaves oval-elliptical, obtuse or scarcely acuminate, entire or irregularly toothed, contracted into a very short petiole, veined on both sides, 4 to 8 in. long. Racemes axillary or lateral, shorter than the leaves or rarely exceeding the shorter upper ones, quite glabrous. Flowers in pairs on an exceedingly short common pedicel so as to appear almost sessile on the rhachis. Perianth slender, glabrous, about $\frac{1}{2}$-in. long. Hypogynous glands broad and truncate so as apparently to form a ring or cup, but really free. Ovary villous. Fruit?

Hab.: Freshwater Creek, near Cairns, *Bellenden-Ker Expedition*. Barron River, *E. Cowley*.

HAKEA, Schrad.

Series Glabrifloræ.

H. gibbosa, *Cav.*; Flora Austr. v. 513. A shrub attaining several feet in height, the young branches and leaves hirsute with spreading hairs, the older foliage sometimes glabrous. Leaves terete, entire,

smooth, rigid, pungent-pointed, 1 to 3 in. long. Flowers in sessile axillary clusters. Pedicels short, densely villous. Perianth glabrous, the tube about 3 lines long, revolute under the globular limb. Ovary contracted into a very short stipes; style not long, with an oblique stigmatic disk. Fruit ovoid-globular, oblique, about 1 in. diameter, rugose, with a very short, thick, obtuse, oblique or incurved beak, the valves with small dorsal horns near the end. Seed-wing narrowly decurrent down both margins of the nucleus.—*Benth. l.c.*

Hab.: Moreton Island, *J. F. Shirley*. Fraser Island, *Hon. Miss Lovell*.

Order AMARYLLIDEÆ.

Tribe AGAVEÆ.

DORYANTHES, Corr.

D. Guilfoylei (n. sp.) Fig. in *Australasian* of Melbourne, Nov. 1892. (After Mr. R. Guilfoyle, Director of Melbourne Botanic Gardens, in recognition of his untiring zeal in creating a taste for the cultivation of Australian plants.) This species differs from those already recorded, in its larger size and in the colour of its flowers. The leaves attain a length of 9 feet with a breadth of over 8 in., the flower-stem a height of over 15 ft., the half of which is occupied by the thyrsoid panicle, the branches of which are more distant from each other than in other species, as well as somewhat longer. The flowers are of an intense vermilion colour, and while larger than those of *D. Palmeri* and *D. Larkeni*, they are less than those of *D. excelsa*.

The various forms of this plant are of so showy a character that they at once recommend themselves as garden plants. Therefore, although to the botanist they cannot be considered more than varieties of the one species *D. excelsa*, Corr., as *D. Palmeri* is given in my Synopsis of the Queensland Flora, I have considered that it would probably be more agreeable to plant cultivators, were they given in future notices as if distinct species: therefore the present superb plant is given as *D. Guilfoylei*. The habit of folage in all is very similar to the typical plant, but the inflorescence of *D. Larkeni*, *D. Palmeri*, and *D. Guilfoylei* all form elongated thyrsoid panicles, and so far differ from each other in the colour of bloom as to be readily distinguishable.

Hab.: Near the Burdekin River, from whence seeds were taken to Melbourne. These were sown in the Melbourne Botanic Gardens, and the object of the present notice is the first plant of those raised which has bloomed.

Order XYRIDEÆ.

XYRIS, Linn.

X. paucifiora, var. albiflos (n. var.) Plant from all appearance annual. Leaves in radical tufts somewhat crimson-coloured, rather flattish and falcate with a slight twist, in the specimen seen none attaining 1 in. in length. Scape about 4 in. high, reddish in the lower half, slightly flexuose and flattened. Flower-head ovoid, about 2 lines long, the scales brown with a few hairs at the top, and hyaline margins. Bracteoles thin, of lighter colour, and slightly keeled. Perianth white, segments ovate-lanceolate. Anthers rather large on filaments not quite so long as the anther and twisted, dorsally

attached. Capsule oblong, the placentas adnate to the apex of the valves. Seeds very numerous, striate, of a deep golden yellow, oblong, ovate to somewhat fusiform.

Hab.: Fraser Island, *Hon. Miss Lovell.*

Upon careful examination of the above plant, I find it only to differ from other varieties or forms in its deep-coloured foliage and white flowers. It was found on damp sandy soil, in company with another small variety of the species, and which I think probable is Robt. Brown's *X. pusilla*. This has the same deep-coloured leaves, but the flowers are yellow.

Order AROIDEÆ.

Tribe PYTHONIEÆ.

AMORPHOPHALLUS, Blume.

A. Galbra (n. sp.) Leaf solitary, expanding to a diameter of over 2 ft. Petioles mottled, about 2 ft. high, with 2 membranous sheathing scales, branching at the top into 3 bifurcate limbs which are pinnate below the first fork, the ultimate branches pinnatifid, divided nearly to the rhachis into lanceolate lobes, with long often thread-like points, attaining the length of 5 or more inches. The veins numerous, parallel, joining in an inter-marginal one rather distant from the edge. Scape about 26 in. long, mottled, somewhat resembling the markings of the carpet snake. Spatha about 11 in. long and about $1\frac{1}{2}$ in. broad in the lower part, tapering to a rather long acuminate point, much mottled on the outside with dark-coloured spots and markings interspersed with splotches and spots of white. Towards the tip and outside edges lightly tinged with palest purple, inside white. Spadix about 5 in. long, of a pure sulphur colour, and a little over $\frac{1}{2}$-in. occupied by the female flowers, $1\frac{1}{2}$ in. by the male flowers, and the remainder by a narrow terminal appendage of a yellow colour, mottled and slightly tinged with green. Inflorescence highly fragrant.

Hab.: Barron River, and known, according to Mr. E. Cowley, by the name of "Galbra." This is a very showy plant and well worthy of garden culture, and the flowers are described as delightfully fragrant.

Order RESTIACEÆ.

LEPYRODIA, R. Br.

L. scariosa, *R. Br.*; Flora Austr. vii. 215. Rhizome creeping. Stems erect, terete, glabrous, 1 to 4 ft. high. Sheathing scales brown, loose, often above 1 in. long, and in some luxuriant specimens over 2 in., the upper ones with short points. Inflorescence a narrow pale-brown thyrsoid panicle, with short unequal erect branches, the lower ones often distant, the others more crowded. Bracts under the lower branches rigid with long points, under the upper branches smaller, broader, and more scarious. Flowers sessile or shortly pedicellate within scarious glumes shorter than the perianth and 2-hyaline bracteoles at the base of the pedicel, sometimes very short, sometimes almost as long as the glume. Perianth-segments in both sexes about 2 lines long, lanceolate, acute, pale-brown. Male flowers with a small rudiment of the ovary, female with slender staminodia.—*Benth. l.c.*

Hab.: Stradbroke Island.

Order LYCOPODIACEÆ.

LYCOPODIUM, Linn.

L. Claræ (n. sp.) (After Miss Clara Cowley, a young energetic collector of the Barron River flora.) Stems pendulous from rocks or trunks of trees, from 1½ to 3½ ft. long, rarely forked, from 1 to 1¾ in. diameter including the leaves, which are so dense as to hide the stem. Leaves lanceolate, much narrowed towards the apex, from ¾ to over 1 in. long, of a somewhat membranous texture, and of a rich glaucous green, the midrib obscure, margins entire. Sporangia in the axils of unaltered leaves, numerous and large.

Hab.: Upper Freshwater Creek, *E. Cowley*. The first specimens of this superb *Lycopodium* received from Mr. Cowley I thought might prove, when better known, to be a form of *L. Dalhousieanum*, Spring.; further specimens, however, show that it is not related to that Borneo plant, but is quite a new species, and, Mr. Cowley tells me, is known to the natives by the name "Goorigen."

By Authority: James C. Beal, Government Printer, William street, Brisbane.

Qv-94 75

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BOTANY BULLETIN No. VIII.

DECEMBER, 1893.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

BY AUTHORITY: EDMUND GREGORY, GOVERNMENT PRINTER, WILLIAM STREET.

1893.

NOTICE.

It was my intention to delay the publication of a part of the matter contained in the present Bulletin until I was in possession of further detail, but certain matters have occurred which make it imperative that, so far as possible, all phytologic matter at all available be issued in the present publication.

I particularly regret that this has to be done, for it was my hope that I should have been enabled to carry out the plan adopted with the Freshwater Algæ, of publishing all similar Families in separate Bulletins; and for this purpose the large number of Lichens determined for us by the eminent specialist, Professor J. Muller, have been kept back from a few of the previous Bulletins, but have now to be given.

Those descriptions, of which printed slips have been issued, and those added during the progress of the printing, are dated.

F. M. B.

30th December, 1893.

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BOTANY:

CONTRIBUTIONS TO QUEENSLAND FLORA.

Order **MALVACEÆ.**

PLAGIANTHUS, Forst.

F. microphyllus, *F. v. M.*, Fragm. i. 29.; Fl. Austr. i. 190; *Halothamnus microphyllus*, F. v. M., Pl. Vict. i. 159. A dwarf rigid shrub, clothed with scurfy scales, very tortuous and branchy, the smaller branches slender and often spinescent. Leaves from linear to oblong-cuneate, rarely exceeding ½-in. and usually much smaller, obtuse or 3-toothed at the end, more or less tapering at the base. Flowers small, sessile or nearly so, 1 to 3 together in the axils, not spicate. Calyx when in flower not above 1½ line long. Carpel usually single, enclosed in the calyx and membranous.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.**

* When these initials are thus given, I am indebted to Baron Mueller for the information of its having been received by him from Queensland, but he has not given me the locality.

Order **RUTACEÆ.**

ERIOSTEMON, Sm.

E. salicifolius, *Sm.*, Fl. Austr. i. 331; *E. lanceolatus*, Gærtn. f. Fr. iii. 154 t. 210; *Crowea scabra*, Grah. in Edinb. Phil. Journ. 1827, 174. An erect shrub, the branches rigid and often angular, glabrous or minutely hoary. Leaves linear or linear-lanceolate, mostly 1 to 2 in. long, rather thick and rigid, glabrous when full-grown, obscurely 1-nerved. Peduncle axillary, short and 1-flowered, with a few broad scale-like imbricate bracts at the base, hoary, with a minute tomentum, as well as the calyx and petals. Sepals short, orbicular, rigid. Petals pink, attaining about ½ inch. Filaments flattened, densely fringed with woolly hairs, clavate and glandular at the top, bearing the anthers on a short stipes as in *Boronia*; anthers tipped with a very short, broad recurved appendage. Ovary glabrous; style slightly pubescent below the middle. Cocci truncate at the top, but not beaked, transversely wrinkled. Seeds smooth and shining.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

Order **OLACINEÆ.**

Tribe ICACINEÆ.

GOMPHANDRA, Wall.

Calyx minute, cup-shaped, 4 or 5-lobed. Corolla campanulate, 4 or 5-lobed; lobes acuminate, inflexed, rarely free, midrib prominent within. Stamens 5, hypogynous, alternate with the petals, filaments thick, dilated above, hairy at the back (in most species), hollowed in

front to receive the anthers. Anthers pendulous from the filiform apex of the filament, 2-lobed, dehiscing lengthwise; pollen-grains triangular. Hypogynous disk thick, annular or none Ovary sterile in the male, oblong in the female flower, 1-celled; style conic, stigma minute or style crowned by a stigmatiferous disk; ovules 2, collateral, pendulous, funicle dilated into an "obturator." Fruit drupaceous, surmounted by the remains of the disk (stigma?), stone crustaceous. Seed pendulous, surrounded by the raphe, albumen fleshy bipartite; embryo minute. Tree with alternate leaves, simple 1-nerved and petiolated. Flowers in axillary, terminal or leaf-opposed cymes; dichlamydeous, hermaphrodite or polygamo-diœcious.—*Hook.*, Fl. British India i. 585.

(This genus is briefly noticed in the Syn. Ql. Fl. p. 65, but it has been thought advisable to give a fuller description here, as a second species has been met with in Queensland.)

G. polymorpha, *Wight.* **var. 6.** A handsome tree of about 60 ft. in height, the inflorescence and young shoots puberulent, otherwise glabrous. Leaves alternate 3 to 5 in. long, ovate-lanceolate, with a more or less elongated blunt apex and cuneate base, petioles about 4 or 5 lines long, dark-green on the upper, pale on the under surface; the primary veins distant, only 3 or 4 on each side of the midrib, reticulate veinlets obscure, margins entire. Flowers in short axillary, dichotomous cymes. Calyx very short and cup-shaped, with almost entire edge. Corolla-tube about 2 lines long with minute teeth, the tips inflexed, from which proceeds down the inside of the corolla-tube a prominent rib. Stamens glabrous, 5, at length exserted and widely spreading, but incurved again near the anthers. Ovary glabrous, 4-angled, stigma sessile. Fruit not as yet been gathered. I cannot separate this plant from the East Indian species, of which several (5) varieties are named and described in Hook., Fl. of Brit. India i. 586. From the fragmentary specimens which I have of *G. australiana*, F. v. M., the present plant seems to differ considerably both in foliage and inflorescence.

Hab.: Scrubs of the Barron River, *E. Cowley.*

September, 1893.

Order RHAMNEÆ.

EMMENOSPERMUM, F. v. M.

E. Cunninghamii, *Benth.*, Fl. Austr. i. 415. Leaves alternate, similar to those of *E. alphitonioides*, except that the petioles are longer. Flowers not seen. Umbel-like symes, apparently not numerous, in a terminal corymbose panicle. Fruit rather larger than *E. alphitonioides*, 3 or 4-celled; epicarp scarcely any; cocci 2-valved. Seeds red and shining as in that species, but not persistent on the torns, and the funicle very small.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

CRYPTANDRA, Sm.

C. spinescens, *Sieb.*, Fl. Austr. i. 439; *C. pyramidalis*, R. Br., in Ann. Sc. Nat. x. 373. Nearly allied to *C. amara*, and with nearly the same foliage; but the branches are usually more twiggy, and the spinous branchlets more densely crowded. Leaves usually linear or linear-oblong, 2 or rarely 3 lines long, but occasionally small and

obovate. Flowers smaller than in *C. amara*, and more distinctly, although very shortly, pedicellate. Calyx 1½ to 2 lines long, narrow-companulate, the adnate base glabrous and suddenly contracted into a little stipes about the length of the imbricate, brown bracts, the free part white-tomentose outside. Ovary almost entirely inferior, the pubescent summit slightly prominent above the adnate part, and obscurely grooved opposite the stamens, but without any distinct disk. Capsule oblong, 1½ to 2 lines long, almost included in the glabrous, elongated, adnate base of the calyx-tube, shortly free in the upper part. Cocci thinly crustaceous.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

Order SAPINDACEÆ.

Sub-order SAPINDEÆ.

CUPANIA, Linn.

C. flagelliformis (n. sp.) (So named from the thong-like branches of panicle.) Aboriginal name at the Barron River, "Maraguigi." A shrub or small tree, the branches angular, dark-coloured except in a young state, when, like the young foliage, they are clothed by a ferruginous or grey tomentum. Leaves, the petiole and rhachis together, measuring from 1 ft. to 16 in. in length, the leaflets scattered, 13 or more, size very irregular, some attaining 6 in. in length, and a width of 1¾ in., the point often much elongated, the base shortly cuneate to a petiolule of about ½ in., margins dentate with large teeth, the primary nerves prominent and parallel, with strongly-marked reticulations between, all more or less hairy on the under side, upper surface of leaflet glabrous, and the reticulations not prominent. Panicles velvety, near the ends of the branches, of few (3 to 5) slender thong-like branches, some of which being about 2 ft. in length; flowers in distant sessile clusters, expanded flower about 4 lines in diameter. Sepals orbicular, much imbricate, silky on the back, irregular as to size. Petals buff-coloured, broad cuneate, undulately lobed at the top, much shorter than the sepals, and bearing at the base of each 2 incurved, hairy, scale-like appendages, much shorter than the petal. Stamens 8, included, filaments hairy, anthers slightly longer than the filaments, oblong, angular, hairy between the blunt angles. Ovary hairy, but probably abortive in the flowers examined. Capsules not as yet obtained.

Hab.: Scrub about the Barron River, *E. Cowley.*

September, 1893.

Sub-order DODONEÆ.

DODONÆA, Linn.

Series Cyclopteræ.

D. lobulata, *F. v. M.*, in Linnæa xxv. 372; Fl. Austr. i. 479. Closely allied on the one hand to *D. attenuata*, and on the other to *D. ptarmicifolia*, glabrous and viscid, the branchlets scarcely angular. Leaves linear or linear-cuneate, obtuse, mostly 1 to 2 in. long; obtusely serrate or pinnatifid, with short, obtuse, callous lobes, coriaceous and rigid, the midrib scarcely conspicuous. Flowers few, in short racemes, the pedicels rather slender. Sepals thin, broadly ovate. Capsule of the smaller forms of *D. viscosa*, the wings not very broad. Seeds smooth and shining.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

Series Pinnatæ.

D. oxyptera, *F. v. M.*, Fragm. i. 74; Fl. Austr. i. 484. A shrub of several feet, the branches virgate, terete, pubescent, as well as the leaves, and more or less viscid. Leaves pinnate, the rhachis angular, but scarcely dilated; leaflets usually 5 to 11, narrow-oblong or oblong-cuneate, obtuse, 2 to 4 lines or rarely ½ in. long, the margins recurved. Flowers small, sessile, or very shortly pedicellate. Sepals broad, acute, about 1 line long. Anthers obtuse, not exceeding the calyx, often hirsute. Capsule small, slightly hairy, the axis 2 or three lines long, the wings rigid, divergent, almost triangular, and acute.—Fl. Austr. l.c.

Hab.: Islands of the Gulf of Carpentaria, *Flora Australiensis.*

Order LEGUMINOSÆ.

Tribe TRIFOLIEÆ.

MELILOTUS, Tournef.

M. alba, *Lam.* The common white Melilot. An erect, wiry-stemmed plant of 2, 3, or more ft. high. Stipules linear acuminate. Leaves pinnately 3-foliolate; leaflets narrow, sharply toothed. Racemes slender, attaining the length of 5 or 6 in. Flowers small white. Calyx-teeth lanceolate, shorter than the tube. Corolla 2 or 3 times the length of the calyx. Pod 1 to 1½ lines, obtuse, and marked with transverse wrinkles.

Hab.: A weed on the cultivation paddocks about Pittsworth. This plant is recorded as a troublesome weed in the fields and vineyards of Southern Europe.

Tribe GALEGEÆ.

INDIGOFERA. Linn.

I. saxicola, *F. v. M.*, Fl. Austr. ii. 199. A shrub of 3 or 4 ft., with spreading branches, slightly hoary, with a minute pubescence. Leaflets 5 or rarely 7, obovate or orbicular, and very obtuse, mostly about 1 in. long, on petiolules of 1 to 2 lines, the pinnate veins scarcely prominent. Racemes pedunculate, rather slender, longer than the leaves. Calyx-teeth shorter than the tube, the upper ones broad and distant. Standard sessile, 3 lines long or rather more; keel acute. Pod terete, spreading, ½ to ¾ in. long, straight.—Fl. Austr. l. c.

Hab.: Queensland, *F. v. M.*

Tribe INGEÆ.

PITHECOLOBIUM, Mart.

P. Lovellæ (n. sp.) A small tree, 20 to 30 ft. high, with a brown smooth bark, the young shoots and inflorescence clothed with dense glossy light-brown hairs, becoming of lighter colour on the older parts. Leaves velvety pubescent, usually with 3 pairs of pinnæ. The common petiole short in the leaves examined, about 1½ in. in length, with a sessile gland near the base; rhachis about 3½ in. long, bearing a sessile gland between the two upper pairs of pinnæ; rhachis of pinnæ from 1 to 2½ in. long, the uppermost pairs of pinnæ and leaflets much the largest. Leaflets 2 pairs each on the lowest and 4 on the terminal pinnæ, nearly sessile, ovate to nearly oblong, from under 1 in. to 2½ in. long, upper surface sparingly hairy, the under surface densely tomentose, margins revolute. Panicle terminal, rather short (judging from the specimen to hand); the sessile flowers in irregular head-like

clusters. Bracts ovate to linear-lanceolate, minute, very hairy. Calyx campanulate, thick, coriaceous, the outside densely clothed with glossy, somewhat bronzed-coloured hairs, inside glabrous and purplish or dark coloured, about 5 lines long, teeth 5, blunt. Corolla-tube exceeding the calyx by 2 or 3 lines, then expanding and funnel-shaped, and deeply divided into 5 linear lobes, clothed on the outside with pale yellowish velvety hairs, the tube and lobes glabrous on the inner surface. Stamens filiform and very numerous, the tubular portion nearly as long as the corolla-tube, and of a deep crimson, free portions exserted beyond the corolla about 1 in. shading from light to deep crimson. Anthers light coloured, minute; style filiform, longer than the stamens.

Hab.: Fraser's Island, *Hon. Miss Lovell.*

This additional Pithecolobium in many respects resembles *P. Tozerii*, but differs from that species in the form of glands and foliage, as well also as in the indumentum.

May 1st, 1893.

Order ROSACEÆ.

Tribe PRUNEÆ.

PYGEUM, Gærtn.

Calyx-tube obconic, urceolate, or campanulate, deciduous; limb 5 to 15-toothed, often unequally. Petals minute, 5 to 6 in the 5 to 6-toothed calyx, none in the 10 to 15-toothed, villous or tomentose, rarely glabrous, often undistinguishable from the calyx lobes. Stamens 10 to 50, in one or more series at the orifice of the calyx-tube, filaments slender, incurved; anthers small. Carpel 1, basal in the calyx-tube, ovoid or subglobose; style terminal, slender, exserted from the bud; stigma capitate; ovules 2, collateral, pendulous. Fruit a transversely oblong, obscurely didymous, rarely subglobose drupe, pericarp thin, dry, or juicy. Cotyledons very thick, hemispheric; radicle minute, superior. Evergreen trees or shrubs. Leaves alternate, persistent, usually quite entire; stipules minute, fugacious, basal glands 2 or none. Flowers small, racemose, sometimes unisexual by want of ovary.—*Hook.*, Fl. Brit. Ind., ii. 318.

Differs from *Prunus* chiefly in the minute villous petals (when present) and form of the fruit. The often conspicuous basal pair of glands on the leaf are very variable, a few species have scattered glands, and one has bullate glands on the tip of the petiole, formed by a prolongation of the leaf-blade.—*Hook. l.c.*

The genus contained previously about twenty species all of Tropical Asia, except one Tropical African species.

P. Turnerianum (n. sp.) (After F. Turner, Botanist to Agricultural Department of New South Wales, who has done so much to bring before the public of that colony the economic value of Australian fodder plants.) Aboriginal name, "Abill." Mr. Cowley says that this name applies to both tree and fruit. A small tree, with small flanges at the base of trunk. The leafy part of the branches densely clothed with ferruginous hairs. Leaves, upper surface bright glossy green, the under surface pale, entire, lanceolate or oblong-lanceolate, 4 to 6½ in. long, 1½ to 2¼ in. broad, primary veins rather distant, very oblique, and looping near the margin, prominent on the underside; upper surface rather glossy, with short appressed hairs along the midrib, and sometimes on other parts of the surface;

the underside more or less hairy, with rather rigid appressed hair of a somewhat yellowish tinge, tapering to a slender petiole of 3 to 5 lines; basal glands irregular as to position, and number 1, 2, or 3, sometimes a marginal one on each side of the midrib below the lowest pair of lateral nerves, sometimes above on the one side and below on the other, or with a gland below the second pair of nerves, oval, dark coloured. Racemes numerous, lateral, 1 or 2 in. long, slender, and softly ferruginous tomentose flowers, male, nearly sessile, calyx-tube widely campanulate, about 2 lines diameter, glabrous, and probably purplish inside, except for a tuft of ferruginous hairs in place of ovary; lobes about 12, narrow, very hairy, the hairs longer at the apex, nearly as long as the tube. Stamens between 30 and 40, filaments coloured, glabrous, a little longer or about as long as the lobes of calyx. Anthers oblong. Female flowers wanting. Drupe of a rich plum colour, transversely slightly exceeding 1 in. in diameter.

Fruit stones of a Pygeum were picked up in the scrubs of tropical Queensland by Mr. Christie Palmerston, and others near Mount Sophia by Mr. A. Meston. The former are blunt-cordate, much compressed, about 1 in. long and nearly as broad, and about $\frac{1}{2}$ in. thick. Putamen of a light brown colour, somewhat smooth like the shell of a hard-shelled almond, marked with prominent, arching, branched veins or ribs, and reticulate between. Those found by Mr. A. Meston at Mount Sophia are more spherical, but broader than long, 11 lines broad and 9 lines long, the reticulation more prominent and closer than in C. Palmerston's examples. From the fruit now to hand from Mr. E. Cowley there can be no doubt but what all belong to one species.

Hab.: For shoot, bearing male flowers, and later branches with ripe fruit, Barron River, *E. Cowley*. Stones of fruit, *Christie Palmerston* and *A. Meston*.

May 1st, 1893.

Order SAXIFRAGEÆ.

Tribe CUNONIEÆ.

WEINMANNIA, Linn.

W. apetala (n. sp.) A tall tree, glabrous except the inflorescence. Leaves opposite, digitately compound, leaflets 3, sessile, lanceolate and bluntly or glandularly serrate, 2 or 3 in. long, the petiole usually under 2 in. long, texture membranaceous. Inflorescence hoary-pubescent, racemose, at the nodes below the leaves of the branchlets. Some of the smaller branchlets are destitute of leaves and then change the inflorescence to a peduncle bearing at its end an umbel of three racemes, the common peduncle 6 to 8 lines, the secondary peduncles about 6 to 8 lines, bearing racemes of from $1\frac{1}{2}$ to 3 in. long; flowers numerous, scattered. Bracts narrow-lanceolate, petiolate, about as long as the pedicels. Pedicels very slender about 2 or 3 lines long. Flowers when expanded 2 lines diameter; calyx-lobes 5. Petals none. Stamens 12 or more, much exserted, the filaments of unequal length, and often somewhat flattened; anthers some much larger than the others, didymous. Styles 2 free; spreading, glabrous. Ovary hirsute except at the very base. Fruit as yet unknown. Flowering in December and January.

The present species approaches near to *W. lachnocarpa* F. v. M., but differs in its more lax slender inflorescence, more membranous leaves, which are not so prominently reticulate; its longer stamens, as well as probably the flower lobes to the calyx.

Hab.: Kamerunga, *E. Cowley*.

September, 1893.

Order MYRTACEÆ.

Tribe CHAMÆLANCIEÆ.

DARWINIA, Rudge.

D. fascicularis, *Rudge*, Trans. Linn. Soc. xi. 299 t. 22; Fl. Austr. iii. 13. An erect much-branched heath-like shrub. Leaves scattered, often crowded, linear, slender, semiterete or obscurely triquetrous, subulate-pointed, mostly 4 to 5 lines long, shortly petiolate, the floral ones not different or slightly longer. Flowers about 6 to 12 together in terminal heads within the last leaves. Bracteoles narrow and short. Calyx slender, not 3 lines long, the adnate part prominently 5-ribbed, otherwise smooth. Lobes very small and scale-like. Petals broad, about $\frac{1}{2}$-line long. Staminodia short and filiform. Style long and slender.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

Tribe MYRTEÆ.

MYRTUS, Linn.

M. exaltata (n. sp.) (So named from its lofty growth.) A tree of from 80 to 100 ft. in height, furnishing a good timber. Bark on the branchlets loose, brownish. Leaves glossy, irregularly opposite or alternate, ovate with often long tail-like points, 2 to 3 in. long $1\frac{1}{2}$ inch. broad, on rather slender petioles of about 3 lines, the primary veins very slender, numerous, parallel, oblique, joining in an intramarginal one more or less distant from the edge, the intermediate veinlets few and distant. Oil-dots minute. (No flowers seen.) Fruit in short, stout racemes in the upper axils, globular, about 5 lines diameter, of a pink colour aud fleshy consistence, containing, so far as could be observed (the fruit being in bad condition), but a solitary seed.

Hab.: Scrubs about the Barron River, the fruit used for jam-making, *E. Cowley.*

September, 1893.

Order COMPOSITÆ.

Tribe ASTEROIDEÆ.

OLEARIA, Mœnch.

O. ramosissima, *Benth.*, Fl. Austr. iii. 479. (*Eurybia ramosissima*, DC.; *Aster cyanodiscus*, F. v. M.; or *Olearia cyanodiscalis*, F. v. M., Fragm. v. 82.) A shrub of 2 or 3 ft., with numerous rather slender branches, scabrous-pubescent, mixed with a little loose wool. Leaves minute, reflexed, clustered in the axils, lanceolate or linear, entire, with revolute margins, all under 1 line long or rarely the larger ones narrow and nearly 2 lines long, glabrous and smooth or scabrous above, with a thin loose wool underneath. Flower-heads solitary at the ends of the branchlets, forming an oblong or rarely corymbose leafy panicle. Involucre broadly turbinate, about 3 lines long, the bracts often coloured and jagged at the edge. Florets blue, those of the rays 12 to 15, more numerous in the disk and longer than the involucre. Achenes more or less villous. Pappus white, with a few short outer bristles.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

CONYZA, Linn.

C. elata (n. sp.). A tall rambling shrub, often attaining the height of 9 or more ft. Stems prominently striate. Leaves alternate, lanceolate, sharply toothed and accuminate, 3 to 5 in. long, the petioles short and slender, the primary veins few and distant, the young growth and inflorescence hoary tomentose, otherwise nearly glabrous. Flower-heads in small corymbs, terminating the lateral branches, clustered or on elongated peduncles. Involucral bracts narrow linear, in 2 or 3 series, the inner ones about 3 lines long, the outer ones broader and only 1 or 2 lines long. Receptacle densely hairy. Outer florets female, with very slender tubes, the lobes setaceous, the long exserted style-branches very narrow and glabrous; the disk or central florets few, male (or hermaphrodite) florets with much wider tubes enclosing the anthers, corolla-lobes as in the males, bearing prominent white bristles; style-branches flattened and echinate, but not so far exserted, but much broader than those of the female florets. Pappus slightly exceeding the involucre, 1-seriate, white. Achenes silky, and flattened, angular, or more or less ribbed.

Hab.: Abounding in the scrubs of the Russell River, and attaining the height of 12 or 14 ft., *Bellenden-Ker Expedition*; Barron River Scrubs, *E. Cowley*.

Tribe INULOIDES.

COLEOCOMA, F. v. M.

Involucre ovoid, the bracts imbricate in several rows, dry, with slightly scarious tips. Receptacle flat, without scales. Florets all tubular, those of the circumference slender, female, 3- to 5-toothed; disk-florets several, hermaphrodite, sterile, 5-toothed. Anthers tailed. Style of the disk-florets usually undivided. Achenes striate, somewhat compressed, those of the disk abortive. Pappus of linear rigid scale-like bristles, those of the female florets united in a long tube, jagged at the end, those of the disk-florets free almost to the base. Low, rigid herb. Leaves alternate, usually toothed. Flower-heads terminal or lateral.—*Benth.* in Fl. Austr. iii. 533.

C. centaurea, *F. v. M.*, Fl. Austr. iii. 533. A low, rigid, erect, branching herb, almost woody at the base, glabrous except for a little woolliness at base of involucre. Leaves linear or lanceolate, acute, with a few acute teeth, contracted at the base, but the upper ones sessile or slightly decurrent. Flower-heads terminal and sessile within the last leaves or at the base of the lateral branches. Involucre 4 or 5 lines long, the bracts very broad, the inner ones with short broad scarious tips, jagged almost as in *Centaurea*. Florets yellow. Achenes rather long, but much shorter than the involucre, the tips of the pappus of the sterile florets slightly protruding.—*Benth. l.c.*

Hab.: St. George, *Jos. Wedd.*

November, 1893.

Order GOODENOVIEÆ.

VELLEIA, Sm.

V. connata, *F. v. M.*, Fl. Austr. iv. 45. Glabrous and glaucous. Radical leaves petiolate, obovate-oblong and toothed or oblong-spathulate and entire, 2 to 3 in. long. Stems tall, dichotomous, with large, broad, connate entire or toothed bracts at the forks. Sepals 5, ovate or ovate-lanceolate, acuminate, the outer one fully 4 lines long, the others smaller, usually connate at the base. Corolla 7 to 8 lines

long, the lower lobes not winged (or the wings destroyed in the specimens, seen?), the upper ones winged on one side and slightly ciliate. Capsule about 3 lines diameter. Seeds about 1 line diameter, including the wing.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

GOODENIA, Sm.

G. heterochila, *F. v. M.*, Fragm. iii. 142.; Fl. Austr. iv. 71. Herbaceous, softly pubescent or villous. Leaves oval-oblong or lanceolate, entire or toothed, 1 to 2 in. long, contracted at the base, the lower ones not seen. Peduncles 1-flowered, axillary, slender, shorter than the leaves, articulate under the flower. Bracteoles none or very minute. Calyx-lobes linear or setaceous. Corolla under ½ in. long, the 3 lower lobes winged and truncate, the 2 upper winged, but with an auricle on the outer side below the middle. Dissepiment of the ovary very short; ovules 4 or 5, large and flat.—Fl. Austr. l.c.

Hab.: I have at times received fragments from the Gulf country, which may probably belong to one or other of the forms of this species.

Order EPACRIDEÆ.

Tribe STYPHELIEÆ.

LEUCOPOGON, R. Br.

L. microphyllus, *R. Br.*, Fl. Austr. iv. 192. (*Perojoa microphylla*, lav. Ic. iv. 29. t. 349. *Peroa microphylla*, Pers. *Styphelia microphylla*, Spreng. *Leucopogon denudatus*, Sieb. *Styphelia denudata*, Spreng. *Leucopogon fraternus*, DC.) An erect or straggling shrub, with rather slender, often twiggy, branches, more or less pubescent. Leaves ovate-oblong, lanceolate or almost linear, obtuse, flat, erect or recurved, 1 to 2 lines long, or sometimes all under 1 line, very rarely a few exceeding 2 lines. Spikes terminal, very short, dense, and few-flowered, clustered so as to form little leafy heads at the ends of the branches. Lower bracts leaf-like, acuminate; bracteoles half as long as the calyx. Sepals about 1 line long, narrow, acuminate and acute or rarely almost obtuse. Corolla under 1⅓ lines long, the lobes as long as the tube. Anthers attached below the short sterile tips. Hypogynous disk truncate or shortly lobed. Ovary 2-celled, tapering into the style. Fruit small, oblong, usually 1-seeded.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

Order ASCLEPIADEÆ.

Tribe CYNANCHEÆ.

VINCETOXICUM, Mœnch.

V. pachylepis (n. sp.) A stout ferruginous climber. Leaves rotund-ovate, apiculate, the base prominently cordate, 3 to 5 in. long, 2½ to 4 in. broad; petioles slender, 1 to 1½ in. long, clothed as well as the principal veins with short brown hairs, the lamina nearly or quite glabrous on both sides. Flowers cream-coloured, fragrant, in pubescent, axillary umbels; peduncle about 1 in. long, the pedicels not exceeding 3 lines. Calyx-segments much overlapping, very broad, nearly orbicular, 2½ lines long, glabrous inside, margins ciliate. Corolla 4 or 5 lines long, contorted in the bud, the lobes twice as long as the tube, thick, and more or less hairy on the inside. Corona composed of 5 free, oblong apiculate, glossy, thick scales, about 1½

lines long; anthers somewhat shorter, but the terminal membrane held in the little point of the corona scale at its back. Pollen masses oblong, glossy. Stigma minutely 2-lobed. Fruit not seen.

Hab.: Kamerunga, *E. Cowley*.

Order CONVOLVULACEÆ.

Tribe CONVOLVULEÆ.

ERYCIBE, Roxb.

E. paniculata, *Roxb.* Flora Austr. iv. 411.; **var. coccinea,** *Bail.* Native name, "Nangbro." Bentham l.c. says berry in the Indian specimens ovoid, above ½ in. long, not seen in the Australian ones. De Candolle Prod. ix. 464. The berry is said to be black, the size of a small cherry. In Brandis's Florist Flora, p. 344, the berry is also said to be black. The colour of berry is very seldom recorded in the descriptions given of the species or varieties of this genus; but in all cases where the berries of P. paniculata are spoken of they are said to be black, thus differing from the Australian plant, in which they are, when fresh, described as of a pleasing cardinal red colour; and they were quite red when they reached my hands. In form oval, about ½ to nearly ¾ in. long; rather fleshy, containing a single seed.

Hab.: I am indebted to Miss Cowley, of Kamerunga, for the ripe fruit of the above plant, which she says is of a pleasing cardinal red in February. The above name is recommended to distinguish the Australian from any of the Indian forms.

IPOMÆA, Linn.

Series Speciosæ.

J. Muelleri, *Benth.*, Fl. Austr. iv. 423. A glabrous, rather slender twiner. Leaves on rather long petioles, very broadly cordate-ovate, obtuse, with rounded basal auricles, entire, 1 to 2 in. long. Peduncles shorter or at length longer than the petioles, bearing 1 to 3 flowers on very short pedicels. Bracts very small. Sepals broad, obtuse, or scarcely acuminate, 4 to 5 lines long. Corolla apparently pink, rather above 1 in. long. Capsule globular, smooth, as long as the calyx. Seeds villous, nearly allied to *I. sepiaria*, but the flowers are smaller and the seeds villous.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

Order SOLANACEÆ.

SOLANUM, Linn.

S. macoorai (n. sp.) Aboriginal name for South Peak of Bellenden Ker Range. A shrub of straggling habit, attaining from 5 to 7 feet in height, the young shoots purplish, appearing glabrous, but with the aid of a lens seen to be more or less covered with minute stellate hairs. Prickles straw-coloured, straight, on the branches, petioles, midrib, and principal veins on both sides of leaf. Leaves ovate, acuminate, unequal sided at the base and tapering to a petiole of about 2 in.; the margins repandly lobed. No flowers seen. Fruit solitary, on a peduncle of about 1 in., globular, yellow, about ¾-in. diameter. Calyx-tube (as seen at base of fruit) with 5 blunt prominent ribs, lobes 2 or 3 lines long with recurved points.

Hab.: Summit of south peak Bellenden-Ker, June, 1889. From the seeds I brought to Brisbane plants were raised at Bowen Park. These grew luxuriantly,

but have all died before producing flowers. The above fragmentary description has been kept back from publication in the hope that flowers would have been obtained from the plants in cultivation. These having been lost, an account is now given of the plant with the hope that some person visiting the locality may collect and forward to the writer a few shoots bearing flowers, or fresh fruits for cultivation.

Order VERBENACEÆ.

Tribe VITICEÆ.

CALLICARPÀ, Linn.

C. longifolia, *Linn.* From Dr. T. G. White, of Geraldton, I hear that the Javanese living in the Johnstone River district make use of the bark of this shrub as a substitute for the Betel-leaf, when chewing the areca-nut with lime. The species has a wide range, being met with in many parts of India and the Malay Peninsula, besides Australia, and therefore it may be put to the above purpose in Java. Dr. Dymock gives the following quotation, when referring to *C. lanata*, Linn. :—"Ainslie says that the bark has a peculiar sub-aromatic and slightly bitter taste, and is chewed by the Cingalese when they cannot obtain Betel-leaves." From the above it is probable that the bark of any species of the genus obtainable is used.

It is strange that the Javanese do not make use of the leaves of one or other of our indigenous Pipers, which, in form of leaf and habit of growth, rather closely resemble the Betel-leaf plant—*Piper Betle.* (P. Mestoni, of the Russell River, belongs to the same tribe of the genus..) Dr. Dymock, in his excellent work "The Vegetable Materia Medica of Western India," gives the following concise notice, extracted verbatim from "Dutt's Hindu Materia Medica" :—"The leaves of this creeper are, as is well known, masticated by the natives of India. The poorer classes make their packets of betel with the addition of lime, catechu, and betel-nuts." The rich add cardamoms, nutmegs, cloves, camphor, and other aromatics. Betel-leaf thus chewed acts as a gentle stimulant and exhilarant. Those accustomed to its use feel a sense of langour when deprived of it. The ancient Hindu writers recommend that betel-leaf should be taken early in the morning, after meals, and at bedtime." According to Susruta, it is aromatic, carminative, stimulant, and astringent. It sweetens the breath, improves the voice, and removes all foulness from the mouth. According to other writers, it acts as an aphrodisiac. Medicinally, it is said to be useful in diseases supposed to be caused by deranged phlegm, and its juice is much used as an adjunct to pills administered in these diseases, the pills being rubbed into an emulsion with the juice of the betel-leaf and licked up. Being always at hand, betel-leaves are used as a domestic remedy in various ways. The stalk of the leaf, smeared with oil, is introduced into the rectum in constipation and tympanitis of children, with the object of inducing the bowels to act. The leaves are applied to the temples in headache for relieving pain; to painful and swollen glands for promoting absorption, and to the mammary gland with the object of checking the secretion of milk. Betel-leaves, known in India by the name Pan, are used as a ready dressing for foul ulcers, which seem to improve under them. In the Concan, the fruit with honey has a reputation as a remedy for cough. Sir James Emerson Tennent says in his account of the island of Ceylon, I., Page 113 :—"Every Singhalese carries in his waistcloth an ornamented box of silver or brass, according

to his means, enclosing a smaller one to hold a portion of chunam (lime obtained by the calcination of shells), whilst the larger contains the nuts of the Areca and a few fresh leaves of the betel-pepper. As inclination or habit impels, he scrapes down the nut, which abounds in catechu, and, rolling it up with a little of the lime in a betel-leaf, the whole is chewed and finally swallowed, after provoking an extreme salivation. No medical prescription could be more judiciously compounded to effect the desired object than this practical combination of antacid, the tonic, and carminative."

Order CHENOPODIACEÆ.

Tribe CHENOLEEÆ.

KOCHIA, Schrad.

K. planifolia, *F. v. M.*, Fragm. i. 213; Fl. Austr. v. 187. An erect divaricately branched shrub of 2 or 3 ft., the branches and young foliage covered with a soft and dense woolly tomentum, which wears off from the older leaves. Leaves oblong or oblanceolate, obtuse, contracted into a distinct petiole, ¼ to ½ in. long, rather thick but flat. Fruiting perianth precisely that of *K. villosa*, glabrous or tomentose, the wing generally entire, membranous and attaining 5 to 6 lines diameter.—Fl. Austr. l. c.

Hab.: Queensland, *F. v. M.*

Order LAURINEÆ.

Tribe PERSEACEÆ.

ENDIANDRA, R. Br.

E. Sankeyana (n. sp.) Aboriginal name at Barron River, "Goolaway." A tree attaining the height of about 70 ft.; the young branches often 4-angular and more or less densely ferruginous velvety-tomentose. Leaves alternate or subopposite at the ends of the branchlets, from elliptical oblong to lanceolate, the larger ones 5 in. long and 2½ in. broad in the widest part, shortly petiolate, the upper surface glabrous, the primary veins sunk, under surface pale, with the primary and reticulate veins very prominent, of a reddish-brown, and more or less velvety. Flowers not seen. Fruit racemes lateral or axillary, erect near the ends of the branchlets, rather slender, about 2½ in. long, with one or two fruit at the end. Fruit black, globose, often compressed, 1 to 1½ in. diameter, resting upon a star-like perianth, not exceeding 2 lines diameter.

Hab.: Scrubs about the Barron River, *E. Cowley.*

Note.—Following my plan of attaching to new native plants from time to time the names of those members of our Royal Society who have evinced an interest in the botany of the colony, to the present new Endiandra is given that of J. R. Sankey, the treasurer of the society and an active member of the Field Naturalist Section. September, 1893.

Order PROTEACEÆ.

BANKSIA, Linn. f.

B. ericifolia, *Linn. f.*, Suppl. 127; Fl. Austr. v. 547. A tall shrub or small tree of 12 to 14 ft.; glabrous except the inflorescence. Leaves crowded, narrow-linear, truncate or notched at the end, and sometimes with an intermediate point, otherwise entire with

closely revolute margins, rarely exceeding $\frac{1}{2}$ in. Spikes cylindrical, 6 to 10 in. long. Bracts with broad shortly acuminate silky-pubescent tips. Perianth yellow, silky, the tube about $\frac{3}{4}$ in. long, the limb ovoid. Style about 1 in. long, hooked, with a very short, thick, stigmatic end. Fruiting cones long and cylindrical. Capsules scarcely protruding, villous but often becoming glabrous, the flat-top $\frac{3}{4}$ to 1 in. broad and 4 or 5 lines thick.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

Order SANTALACEÆ.

CHORETRUM, R. Br.

C. glomeratum, *R. Br.*, Fl. Austr. vi. 218. An erect shrub, sometimes scarcely 1 ft. high, sometimes almost arborescent, with numerous erect, slender, wiry, angular branches. Leaves reduced to minute, subulate, deciduous scales. Flowers small, in clusters of from 2 to 5 on very short common peduncles not exceeding 1 line, each cluster surrounded by 3 or 4 minute almost orbicular bracts. Perianth about $\frac{3}{4}$ line long, the broadly turbinate adnate tube not above half the length of the lobes, the external margin very slightly prominent. Drupe when dry 2 to 4 lines long, globular or slightly ovoid.—*Benth., l.c.*

Hab.: Near Dalby, *Dr. Thos. L. Bancroft.* The specimens submitted to me were in early bud and flower.

Order CUPULIFERÆ.

Flowers monœcious. Males in spikes or catkins. Perianth of 1 or several usually unequal scales, segments or lobes. Stamens 1 or more, with or without a central rudimentary pistil; filaments slender; anthers 2-celled. Female flowers solitary or few together, surrounded by scales or bracts either remaining free or more frequently united in an entire or lobed involucre often enclosing the fruits, and sometimes growing out into setæ or prickles. Perianth-tube adnate to the ovary, the limb usually 6-toothed. Ovary inferior, 1-celled or more or less perfectly 3 or more celled. Styles as many as cells, simple, stigmatic in the upper portion. Ovules 1 or 2 in each cell, erect or pendulous. Fruit consisting of one or more nuts placed upon, or more or less enclosed in, the usually enlarged persistent involucre. Seeds usually solitary in each nut, without albumen. Embryo various, the radicle usually superior. Trees or shrubs. Leaves alternate, penniveined, with or without stipules. Male catkins usually falling off entire.—*Benth.*, in Fl. Austr. vi. 209.

FAGUS, Linn.

(So called from *Phago* to eat; because the nuts were used as food in the early ages.)

Male flowers in globular pendulous catkins within small scales, falling off very early, or rarely solitary. Perianths shortly stalked within each catkin-scale, campanulate, 4 to 6-lobed, containing 8 to 16 stamens, with protruding filaments. Female catkins globular, almost sessile, the scales linear, with numerous closely-packed filiform inner scales, all empty except the innermost and forming an involucre round 2 to 4 sessile flowers in the centre of the catkin. Perianth-limb of

4 or 5 short lobes. Ovary 3-celled, with 2 pendulous ovules in each cell. Styles 3. Nuts 2 to 4, angled or winged, enclosed in a hard prickly involucre, composed of the combined scales of the catkin, and opening in 4 valves. Trees or rarely shrubs. Leaves alternate, coriaceous, penniveined, frequently plicate and toothed. Stipules usually deciduous. Male catkins usually in the lower axils, the females in the upper ones.—*Benth.*, Fl. Austr. l.c.

F. Moorei, *F. v. M.*, Fragm. v. 109; Fl. Austr. vi. 211. (*F. Carronii*, C. Moore, Negro Head of N.S. Wales.) (After C. Moore, Director of Sydney Botanic Garden.) A tree attaining the height of 150 ft. Leaves 1 to 2 in. long on the barren shoots, $\frac{3}{4}$ to 1 in. on the flowering branches, ovate or ovate-lanceolate, crenate, acute or a few only of the lowest obtuse, flat and coriaceous as in *F. Cunninghamii*, but with more numerous and rather more prominent primary veins. Male catkins in the lower axils on short recurved peduncles. Involucre irregularly 8 to 12-lobed, and mostly splitting. Stamens about 20. Female catkins in the upper axils on erect short peduncles, ovoid, glandular, containing 3 flowers each. Ovary of the 2 outer flowers 3-angled and 3-winged, of the inner flower flattened and 2-winged. Fruiting involucre about 5 lines long.—*Benth.*, Fl. Austr. in part; *Moore's* Fl. of N.S. Wales in part.

Hab.: Baron Mueller writes me that he has received specimens of this tree, which were gathered by Mr. R. Collins on high mountains towards Tamrookam. Found in New South Wales, at the head of Bellinger River, and head of Macleay River.

Order ARISTOLOCHIACEÆ.

ARISTOLOCHIA, Linn.

A. prævenosa, *F. v. M.*, Fragm. ii. 166; Fl. Austr. vi. 208. A tall climber, the young branches and principal veins of the underside of the leaves ferruginous-pubescent or nearly glabrous. Leaves petiolate, from ovate-oblong and 3 to 4 in. long, to narrow-oblong and 8 to 10 in., obtuse or obtusely acuminate, rounded or slightly cordate at the base, coriaceous, shining above, penniveined and more or less distinctly 3 or 5-nerved, with numerous prominent transverse and reticulate veinlets underneath. Flowers unknown. Fruit of a rich yellow colour, somewhat succulent, oblong somewhat narrowed towards the base, and the apex with a short point, fully $1\frac{1}{2}$ in. long, and 10 lines in diameter, with 6 prominent ribs. Seeds compressed, triangular, the upper angles rounded, resembling in shape the pods of the Shepherd's purse, the sides slightly tubercular-rugose.

Hab.: Macpherson Range, *J. F. Shirley;* Nerang Creek, *H. Schneider.* Specimens from both localities in fruit only. First met with at the Clarence River, New South Wales.

Order COMMELYNACEÆ.

Tribe TRADESCANTIEÆ.

CARTONEMA, R. Br.

C. spicatum, *R. Br.*, Fl. Austr. vii. 91. Stems branching at the base, usually hairy, 6 in. high below the spike. Leaves linear, tapering from a base of $1\frac{1}{2}$ to 3 lines broad just above the sheath to a long point, the longer ones usually exceeding the spike. Spike 1 to 3, sometimes very compact and only 2 in. long, rarely elongated to 6 in.,

and rather loose. Bracts linear-subulate, shorter than the perianth. Outer perianth segments subulate-acuminate, 5 to 6 lines long, very hairy; inner segments obovate, nearly as long, often but not always spotted. Filaments slightly flattened, at first shorter, but at length rather longer than the oblong-linear anthers, which open in terminal pores, rarely splitting down the sides of the cells. Ovary and capsule glabrous.—*Benth., l.c.*

Hab.: Thursday Island, *E. Cowley*. Not previously met with in Queensland, but has been found in several localities of North Australia.

Order CENTROLEPIDEÆ.

CENTROLEPIS, Labill.

C. aristata, *Ræm. et Schult.*, Fl. Austr. vii. 206. (*Desvauxia aristata*, R. Br.) Leaves linear, sometimes very short and fine, but often a few of them nearly $\frac{1}{2}$ line broad and above 1 in. long. Scapes 1 to 2 in. high, or in luxuriant specimens twice that height, flattened under the spike. Floral bracts close together, glabrous, ovate erect, 2 to near 3 lines long, with long leafy points, that of the lower bract often $\frac{1}{3}$ in. and sometimes 1 in. long, the other one shorter. Flowers in each bract from 6 to about 20, intermixed with hyaline scales, some very narrow and entire, others broader and jagged at the end, always 1 under each stamen, and 1 under or by the side of each ovary, with a few apparently additional ones. Carpels of the ovary few, varying from 3 or 4 to 6 or 7.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

Order CYPERACEÆ.

CYPERUS, Linn.

C. platystylis, *R. Br.*, Fl. Austr. vii. 264. Stems tufted, rather stout, not above 1 ft. high. Leaves rather broad, shorter and mostly much shorter than the stem, with flattened acutely-keeled sheaths. Umbel very compact, of about 6 rays, the longest under 1 in. Spikelets 6 to 12 in the clusters. Involucral bracts, 1 or 2 longer than the inflorescence, and one or two short. Spikelets brown, flat, but rather thick, 4 to 6 lines long, $1\frac{1}{2}$ lines broad, acute, the rhachis not winged. Glumes very regularly distichous and imbricate, broadly concave, the lower ones obtuse, the upper ones acute, the keel slightly prominent, sometimes produced into a short point, the nerves very faint. Style 2 or 3-cleft, flattened or triquetrous in the upper part, the angles ciliate. Nut oblong or oval-oblong, as long as the glume, the flat face next the rhachis, the back convex. The style is quite that of *Fimbristylis*, all the other characters those of *Cyperus*.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

CAREX, Linn.

C. chlorantha, *R. Br.*, Fl. Austr. vii. 440. Stems usually under 6 in., but sometimes above 1 ft. high. Leaves much shorter. Spikelets 6 to 12, sessile in a dense terminal spike of $\frac{1}{2}$ to 1 in., or rarely rather longer and interrupted at the base, and then slightly compound with more numerous spikelets, the spikelets all or mostly androgynous, ovoid-oblong, 2 to 3 lines long, usually brown. Outer bracts glume-

like, or rarely the lowest with a subulate lamina nearly as long as the inflorescence. Glumes ovate, 1 to 1¼ lines long, acute or mucronate, the keel usually green. Male flowers few at the top of the spikelet. Utricle as long as the glume, much flattened, the edges ciliate, tapering into a short 2-toothed beak. Style-branches 2. Nut flat.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

Order GRAMINEÆ.

Tribe PANICEÆ.

PANICUM, Linn.

P. cœnicolum, *F. v. M.*, Austr. vii. 467. Stems from a knotty branching base ascending to 1 ft. or more. Leaves flat, usually softly pubescent or villous. Panicle of rather numerous slender simple branches, 3 to 4 in. long, at first erect, at length spreading, the lower ones verticillate, the upper ones alternate and distant or rarely in pairs. Spikelets in pairs, 1 sessile, the other pedicellate, oblong, 1½ to 2 lines long. Outer glume not exceeding ½ line, the 2nd rather shorter than the spikelet, 5 or 7-nerved: the 3rd 7 to 11-nerved, both more or less silky-hairy and empty. Fruiting glume smooth, acute.—Fl. Austr. l.c.

Hab.: Queensland, *F. v. M.*

Tribe ANDROPOGONEÆ.

ROTTBOELLIA, Linn. f.

R. rariflora (n. sp.) A decumbent pubescent grass, probably annual, shortly creeping and rooting at the base, the stems slender intricate and leafy throughout their whole length. Leaves with loose sheaths, the lamina from ¾ to 1½ in. long, narrow-lanceolate; ligula very short and jagged, hidden by the long hairs on the face of the lamina near the base. Peduncles solitary or two or more together in the axils, articulate near the middle, and there bearing a rather long obtuse close sheathing bract, peduncle terminated by a subulate bract about 2 lines long, green, 3-nerved, with nerve-like margins, half enclosing a spikelet of usually a single flower. Outer glume about 1 or 1½ line long, nearly white, smooth and hard, faintly 3-nerved; 2nd glume hyaline and faintly 1-nerved, the 3rd and 4th glume or palea hyaline. Stamens 3. Grain enclosed in the hyaline glume and palea but free from them. The above name is given provisionally.

Hab.: Batavia River, *Hugh Millman.* Cape York Peninsula, *Geo. Jacobson.*

Order FILICES.

ASPLENIUM, Linn.

A. flaccidum, *Forst.*, Fl. Austr. vii. 749. Rhizome stout, erect, crowned with large, subulate-lanceolate membranous scales. Stipes stout, rather short, compressed or somewhat 3-angular. Fronds under 1 ft. to 2 ft., or, in New Zealand, twice that length; pinnate or bi-pinnate, with winged rhachis; polymorphous, coriaceous, pendulous, glabrous, and from a deep to a pale-green colour; lanceolate, acuminate in outline, pinnæ narrow, 3 to 6 or more in. long, the barren ones toothed, the fertile divided into linear lobes of 2 to 6 lines, each

bearing a single, rather large, sorus attached to the central vein; but the conspicuous indusium thrown over to the upper side so as to appear marginal.

Hab.: Spring Creek, Killarney, *M. E. Milward*. This fern is also met with in New South Wales, Victoria, Tasmania, and New Zealand. Dr. Robt. Brown named *A. odontites*.

Order MUSCI.

ARCHIDIUM, Bridel.

A. brisbanicum, *Broth.*, in Bail. Contrib. Queensl. Fl. Bull. n. 7, p. 23 (name only). Monœcious, gregarious, small, green; stems very short, erect, destitute of stolons; lower leaves minute, remote, rather reflexed; foliage leaves much larger, crowded, erecto-patent, from the base lanceolate-subulate, shortly aristate by the longer vein, margins erect, above denticulate, vein at the base about ·05 mm. wide, produced into a short, denticulate awn; cells loosely parenchymatous, rhomboid, wholly pellucid, dilutely chlorophyllose; perichætial bracts similar to the leaves, but longer, exceeded by the much longer vein; thecæ globose minute, soft, thinly clothed; spores ·1-·12 mm., brown, papillose. Perigonia in the branches, very short, basilar, terminal with lanceolate bracts sparingly denticulate and veinless, antheridia few, without paraphyses.

Hab.: Ipswich road, near Brisbane, *H. Tryon*.

LEUCOLOMA, Bridel.

L. clavinerve, *C. Mull.*, in Lett. Second Suppl. Qd. Fl. p. 68 (name only). Diœcious, cæspitose in dense tufts, glaucous green, not at all shining; stems procumbent, very densely branched stems erect, straight, short, terete, acute, very densely foliaged, usually divided above, branchlets fastigiate, very short, erect; leaves when dry closely imbricate, when moist erect, canaliculato-concave, from the base oblong acuminate, terminated by the projecting club-shaped vein, the terminal point of the apex hyaline, margins erect, apex incurved, entire, limbate, border hyaline, very narrow, composed of elongated very narrow cellules, but obsolete at the base and apex, vein hyaline, at the base about ·05 mm. wide, very smooth, green, protracted into a club-shaped deciduous appendix, with hyaline tip, basilar cells very smooth, sparingly chlorophyllose, elongated and narrowly rectangular, the lower ones golden, with quadrate cellules in the margins; in the blade of the leaf there are many series of quadrate, hyaline cellules, the superior ones of which are verrucose, pellucid, minute, quadrate, incrassate, and chlorophyllose. The other parts are unknown.

Hab.: Petrie's Quarries, Brisbane, *H. Tryon*.

FISSIDENS, Bridel.

F. (Conomitrium) splachnoides, *Broth.*, in Bail. Contrib. Queensl. Fl. Bull. n. 13, p. 21 (name only). Diœcious, cæspitose with densish tufts, lowly, fragile, pale-green, somewhat polished; stems very short, scarcely more than 3 mm. high, rather thick, beneath red, above pale, in the lower parts of the base radiculose, with long radicles, brownish-red, above sparingly foliaged, simple; leaves 3-4-jugate, alternate, very flaccid, for the plant large, oblong, shortly acuminate,

with oblique apex, 1·4-1·5 x ·4-·5 mm., entire everywhere limbate, border very narrow, whitish, lamina nerveless, with large splachnoids, lax, oval-hexagonal cellules, ·04-·05 x ·02-·025 mm., the basal cellules larger, sparingly chlorophyllose, very smooth; perichætia terminal, with few very small bracts. Other parts unknown. Male plants similar to the female, and growing in the same tuft; perigonia terminal, with few, very small bracts, widely vaginate, acuminate, and numerous antheridia.

Hab.: Indooroopilly, Queensland, *Field Naturalists.*

BRYUM, Linn.

B. (Eubryum) Tryoni, *Broth.*, in Bail. Bot. Bull. No. 7, p. 24 (name only). Dicœcious, cæspitose, in laxish tufts, lowly, deep green, shining; stems to 4 mm. high, erect, very densely radiculose, above densely foliaged, varying little, erect, straight, very short, crowded together; stem and foliage when dry appressed, when moist erecto-patent, carinato-concave, not at all decurrent, oblong-lanceolate, cuspidate by the shortly excerted vein, margins revolute, above denticulate, bordered, border narrow, indistinct, vein viridi-rufescent, shortly exserted, denticulate, with oblong-hexagonal cellules in the centre of the leaf, ·05-·075 x ·015 mm., basilar cellules subquadrate, purple; perichætial bracts smaller than the leaves, lanceolate, including numerous archegonia and short paraphyses; setæ to 2 cm. high, base geniculate-ascendant, apex arcuate, thin, red, scarcely shining, when dry not at all twisted; thecæ pendulous, of short cells (·75 mm.), when dry rugulose-subcylindrical, with neck about 3 mm. long and ·75 mm. wide, not at all constricted beneath the mouth, at length purple, not shining; annulus wide, double, in part seceding; peristome duplex; exostome whether moist or dry with teeth connivent, about ·475 mm. by ·075 mm., very dense and trabeculate above, pallid, with hyaline apex and border, everywhere minutely papillose; endostome perfectly free, hyaline, very densely papillose with carinate processes, strongly perforate, slightly shorter than the teeth, cilia 2, lengthily appendiculate; spores ·008-·01 mm., ochraceous, very smooth; operculum tall, convex, with very distinct apex, obtuse. The male plant is unknown.

Hab.: West End, South Brisbane, *H. Tryon.*

B. (Eubryum) immarginatum, *Broth.*, in Bail. Cont. Queensl. Fl. Bull. n. 13, p. 21 (name only). Dicœcious, cæspitose, in dense lowly tufts, fragile, green. Stems scarcely 2-3 mm. high, red, with long brown radicles, densely foliaged, rarely becoming 3-5 mm. high, erect, red, loosely, from base to apex subcomose-foliose; leaves when dry a little contorted, when moist erecto-patent, concave, not at all decurrent, oblong or oblong-oval, shortly aristate by the exserted vein, 1-3-1-5 x ·57 mm., entire, not at all limbate, the margin more or less revolute, apex erect, vein thick, rufescent, ending in a short awn, rigid, slightly reflexed, very acute, of lax cells, with fine cell coat, oval-hexagonal in the centre of the leaf, ·03-·045 x ·017-·02 mm., the basilar ones subrectangular, purple; perichætial bracts lanceolate with entire margins, revolute, the vein considerably exserted; setæ to 15 mm. in length, flexuose, thin, red, apex pale; thecæ horizontal, subcylindrical, thin-walled, with short neck ·4 mm. long and ·75 mm. thick, symmetrical, large-mouthed, pallid, not at all shining; annulus broad, in part seceding; the peristome resembles that of B. capillare;

spores ·01-·012 mm., lutescent-greenish, very smooth; operculum hemispherical, lengthily apiculate, pallid. The male plant is unknown.

Hab.: Mount Perry, Queensland, *James Keys*.

HOOKERIA, Sm.

H. (Euhookeria) Karsteniana, *Broth. Geh.* Synœcious, creeping, flaccid, complanate, pale-green, densely branched, with decumbent branches, the leaves about 2 mm. wide, obtuse; leaves delicate, hyaline, lateral, when humid, patent, asymetrical, widely oblong, rather obtuse, terminating in a very short apex, limbate, the border very narrow, hyaline, produced to the summit of the apex, with margins erect, above minutely denticulate, with two veins, pallid, slender, and diverging from the base, abrupt beneath the apex, very smooth; cellules everywhere lax, hyaline, above shortly hexagonal ·05-·06 x ·04-·045 mm., the basilar ones longer, all very smooth; perichætial bracts ovate-lanceolate, very acuminate, apex denticulate, nerveless; setæ to 1·5 cm., erect, purple, very fine and smooth; thecæ minute, oval, horizontal, atropurpureous; peristome normal; spores ·01-·012 mm., obscurely green, very smooth. Other parts unknown.

Hab.: Bellenden-Ker Range, *Karsten*.

PTEROBRYUM, Hornsch.

P. (Trachyloma) recurvulum *C. Mull.*, Bail. Syn. Queensl. Fl. 3rd Supp., p. 98 (name only). Diœcious (?), cæspitose, deep green, shining; stems creeping, branches 7-13 cm. long, flexuose, more or less densely pinnate, apex usually simple and recurved, sparingly complanate, turgid, obtuse, with short branchlets, 1-1·5 cm. long, outspread, straitish, somewhat complanate, turgid, obtuse; leaves densely crowded, prettily embossed, when moist outspread, cymbiform-concave, from the base cordate, with circinate, auricles undulate, the stems amplectent, ovate-ligulate, abruptly and shortly acuminate, the margins everywhere erect, very minutely serrulate, the vein very slender, green, scarcely produced beyond the middle of the leaf, somewhat bifurcate, cellules narrow, at both ends acuminate, replete with chlorophyll, scarcely distinct in the wings, the basilar and deeper ones more lax, in all parts smooth.

Hab.: Bellenden-Ker, *Expedition* 1889.

Of this Dr. V. F. Brotherus says "This pretty species resembles, in habit and structure of leaves, species of the genus *Calyptothecium* much more than any of those hitherto known of the genus or sub-genus *Trachyloma*, and should, I think, rather be referred to the former than the latter. As, however, fructiferous specimens are unknown, this matter must be left undecided for the present.

THUIDIUM, Schimp.

T. nano-delicatulum *Hampe* (*Cyrto-Hypnum nano-delicatulum, Hampe*) *S. pennula* C. Mull., in Bail. Syn. Queen. Bot., 3rd Supp. p. 98 (name only). Female plant robust, rigid, green, when old brown; stems stout, elongate, creeping, frequently divided, interruptedly rooted to the ground and alternately and arcuately rising from it, the divisions strikingly regular and densely bipinnate, pinnæ 1·5-2 cm. long, arcuate, with subequal pinnules, 2-5 mm. long, the higher ones shorter, simple, or rarely indistinctly ramulose; cauline leaves distant, squarrose, plicate, from the base dilatate, subcordate,

suddenly alternate, aristate by the very lengthily exserted vein, with margins from base to centre more or less revolute, minutely crenulate, apex serrulate, vein thick, lutescent, ending in a stout awn, very long and serrulate; cellules incrassate, papillose, pellucid, oval, the basilar ones larger, the marginal subrotund, leaves in the branchlets minute, when dry adpressed, when humid erect, concave, ovate-lanceolate, with serrulate margins, vein pallid, beneath the apex vanishing, the back distantly spinulose, with stout papillose cells, subrotund, the apex truncate, crowned with acute papillæ, paraphyllia numerous, confervoid, ramose, papillose, perichætial bracts fuscescent-lutescent, from the base delatate, towards the apex piliform, long, flexuose, margins erect, lengthily and beautifully fimbriate with filiform cilia, simple, apex denticulate, vein slender, cellules longer, narrower, and smoother; other parts unknown.

Hab.: Near Brisbane, *Bail.*; North Pine River, *G. T. Musson.*

Order HEPATICÆ.

DENDROCEROS, Nees.

Fronds broad, linear, primately branched, remarkably crisped; lobes thin, and of a single stratum, occasionally divided into laciniæ that simulate leaves; cellules quadrate, strengthened at the angles, gonidia none; costa well defined, slender, of more than one stratum. Reproductive organs monœcious; females rising from beneath the costa; capsules pedunculate, with exserted involucre; elaters of a single spire, perfectly helicoidal; antheridia biseriate in the costa.

D. crispatus (*Hook?*), *Nees. Trans. and Proceedings of the Bot. Soc. Edinb. xv. Part II.* (*Monoclea, crispata*, Hook. Bot. Misc. ii. 117 t. 27.) Fronds of a beautiful green, cæspitose-procumbent, 2 cm. long, ascending, bipinnatifid, laciniæ short, broadly linear, contiguous or subimbricate, strikingly sinuate-crisped, and plainly but slenderly costate; apex truncate-rotundate, often furcate; costa in section semilanceolate or oblong, in the middle 8 cellules thick, beneath slightly radicellose, at the interstices of the branches geniculate-subflexuose; cellulus of the fronds in a single stratum, moderate, quadrate-hexagonal, strengthened and thickened at the angles, within flexuose, and with a copious endochrome. Flowers monœcious; females showing above the frond, arising from the costa near the forks of the branches. Involucre at first short, with slender apex, clothing the base of the solitary obclavate oogonium, when mature linear-coroniform, erecto-incurved, the mouth protracted into a linguiform lip, papillose, carnose, 6-striate. Peduncles short, almost wholly immersed, base hidden within the oblong carnose involucel pallid of 3 layers of cells (6 in diameter), the central ones filled with chlorophyll. Capsule semiemersed, longer than the involucre, linear-cylindrical, rufous, bivalved, with filiform persistent columella. Elaters medium, obtuse, furnished with spiral fibres. Spores rather large and rough. Antheridia uniseriate on both sides of the costa, solitary, subglobose, emerging from the apices of mamillæ.

Hab.: On bark of trees Tambourine Mountain, *C. J. Wild*, 1893.

First found on trees at the Island of St. Vincent. I believe Mr. Wild's specimens belong to the above, but until they have been examined by a specialist some doubts will remain.

D. Muelleri, *Stephani*, *Hedw.* 1889, page 6. Frond 3 cm. long, furcately divided, slender, deep green, base brownish; costa pallid, broad, thick, cavernose (cavities broadly tri-quadriseriate), the superficies therefore laxly reticulate, passing abruptly into the wings. Wings of a single stratum, crispate, scarcely broader than the costa, very deeply lobate, almost to the end of the frond separated into parts or segments; lobules repando-dentate, alternate, and simulating true leaves. Cellules ·035 mm., with thickened nodulose angles, towards the margin ·017 mm., the wings of the fronds perforate with intercellular interstices. Female flowers at the base of the bifurcations, surrounded by the large and strongly crispate lobules; involucre narrowly cylindrical, 4 mm. long. the cellules of the base 5-6 series thick. Andrœcia approximating to the margin of the costa, 2-3 seriate, filled with large, obovate solitary anthers, the pedicels equalling them in length. Capsules 2 cm. long, ·05 mm. in diameter, involucre about twice as long, fuciform, the base deep green (spores immature), above beautifully golden; cellules convex, ·035 x ·017 mm., walls unequally thick; columella stout, spores green, 10-cellular, ·06 mm. in diameter, cuticle granulate, florescent. Elaters ·5 x ·008 mm., twisted into a single lax spiral.

Hab.: Bellenden-Ker Range, *Sayer*, 1886.

Order LICHENES.

The information given concerning the following lichens, reported for the first time as natives of Queensland, together with the notes and remarks on species whose descriptions have not been hitherto fully supplied, or which have been reported by other authors under incorrect or obsolete synonyms, is compiled for this Bulletin by Mr. John Shirley, B.Sc.

Family I.—COLLEMACEÆ, *Mull. Arg.* Enum. Lich. Gen. p. 18.

Tribe I.—COLLEMEÆ, *Korb.* Par. p. 408.

LEPTOGIUM, Fr., pro. p.

L. tremelloides, v. isidiosa *Mull. Arg.* Upper surface of thalline laciniæ, and the margins, in places, provided with cæspitose subfoliaceous isidiellæ.—Lich. Beit. 374.

Hab.: Main Range, near Toowoomba.

Family II.—EPICONIACEÆ, *Mull. Arg.* Enum. Lich. Gen. p. 18.

Tribe II.—CALICIEÆ, *Mull. Arg.* Enum. Lich. Genéve p. 19.

CALICIUM, Ach.

C. trachelinum, *Ach.* Thallus cinerascent, thin, granulose, or frequently obsolete; apothecia medium or large, the capitulum turbinate-globose and red or reddish below, sporal mass black; spores blackish, ellipsoid, in the centre moderately constricted, 1-septate, ·008-·013 x ·004-·007 mm.—*Nyl.* Syn. 1. 154.

Syn.—*C. glebosum v. concinnum*, Wilson, and *C. hymenosporum*, Wilson.

C. victoriæ v. jejunum, *Wilson.* Botany Bulletin No. 2, p. 30.

Rev. F. R. M. Wilson says: "*C. jejunum*, reported by me (Trans. Lin. Soc. 1890), is now judged by me to be a *not clearly marked* form of *C. victoriæ*."—Proc. Roy. Soc. Vict. 1893 p. 163.

PYRGILLUS, Nyl.

P. javanicus, *Nyl.* The following are synonyms of this lichen:—
Calicium stenosporum, Wilson, Botany Bulletin No. 2, p. 29; and
Pyrgillus australiensis, Wilson, Bot. Bull. No. 2, p. 31.

TYLOPHORON, Nyl. Prod. Lich. Nov. Gran. p. 430.

Thallus crustaceous, apothecia (at first wholly enclosed in whitish, or white, subglobose verrucæ, or thalline tubercles) with shortly cylindrical or cupular innate thalline receptacle. The sporal mass protruding; spermagonia colourless, innate; sterigmata cylindrical, somewhat branched; spermatia acicular, straight. This genus differs from Calicium and Trachylia, as Lecanora differs from Lecidea.

T. triloculare, *Mull. Arg.* (nov. sp.) Thallus argillaceous or whitish, thinly tartareous, diffracto-areolate, and the whole surface crowdedly sub-granular; apothecia ½-mm. wide or less, much wider than high, the base thalline-girdled, elsewhere free; perithecium outwardly nigro-fuscous, the true margin obtuse, not truncate-acute; disk plane or sub-concave, and above nigro-fuscous; hypothecium nigro-fuscous; lamina hyaline and above usually evanescent, covered with a thick stratum of spores; spores in narrow asci, or free, ellipsoid, brown, ·011-·013 x ·0065 mm.

Hab.: Main Range, near Toowoomba.

ACOLIUM (Fee) D.N.

Apothecia crateriform, or now urn-shaped, sessile; a black proper excipulum, which is either naked or margined by an accessory thalline one. Spores spherical and simple, or 2-4 locular, or even muriform, brown. Thallus crustaceous, rarely lobulate, mostly uniform.—*Willey* Int. St. Lich. p. 40.

A. buelliaceum, *J. Mull.* (nov. sp.) Thallus white, very thin, rather smooth, continuous or slightly rimulose, margin effuse; apothecia when evolute 1 mm. wide, sessile, three times broader than high, truncate-plane, and girdled with a thick entire, pulverulent border. Between the proper black margin and the white thalline one there is a vestige of a third integument. The junior apothecia are enclosed in small hemispherical verrucæ; disk plane, black, slightly albo-pulverulent; spores brown, bilocular or 3-locular, ·01-·011 x ·006-·0065 mm.

Hab.: Main Range, near Toowoomba.

FAMILY III.—LICHENACEÆ, *J. Mull.*, Lich. Socot. and Enum. Lich. Gen. p. 18.

TRIBE III.—CLADONIEÆ, *J. Mull.* Enum. Lich. Gen. p. 22.

CLADONIA, Hffm.

PHÆOCARPÆ SCYPHOPHORÆ.

C. fimbriata v. antilopæa, *J. Mull.*, s. *Cladonia delicata*, Wilson (non. Flk.); Lich. Fl. Queensl. p. 17.

C. degenerans, *Ach.*; **v. pleolepis,** *Flk.* Podetia short, cinereo-fuscescent, rigid, foliaceous-squamulose; scyphi irregular, lacerate-crisped, here and there at the margins ramose, proliferous, substerile.—*Acharius*, Syn. Lich. p. 259.

Hab.: Main Range, near Toowoomba.

PHÆOCARPÆ ASCYPHÆ.

C. furcata v. foliolosa, *J. Mull.* Podetia ½ in., nigrescent, rigid, squamose-granulose, sparingly foliolose; apices cylindrical right up to the apothecia, and not at all scyphose-incrassate.

Syn.—*C. pityrea v. foliolosa*, J. Mull., Lich. Beit. 1005.

Hab.: Mount Perry.

ERYTHROCARPÆ SCYPHOPHORÆ.

C. macilenta, v. flabellulata, *J. Mull.* (var. nov.) Podetia 9-12 mm. long, below 2-3 mm. thick or thinner, from the centre or higher copiously and finely flabellose-ramose, wholly granulose-pulverulent and destitute of scales.

Hab.: Wickham Terrace, on moist earth.

TRIBE IV.—RAMALINEÆ, *Th. M. Fries*, Gen. Heterolich p. 50.

RAMALINA, Ach.

R. Ecklonii, *Mnt.*; **v. tenuissima,** *Mey. et Flot.* Frond ⅛-½ in. long, laciniæ at the base about 1 mm. wide or narrower, gradually becoming finely acuminate, slightly canaliculate-concave or subplane. Spores ·012-·014 x ·005-·0055 mm., slightly curved or wholly straight. Rev. Lich. Mey. p. 311, Lich. Beit. 1478.

Hab.: Main Range, near Toowoomba.

R. inflata, v. olivacea, *J. Mull.* Thallus olivaceous-obscure; apothecia obsoletely æruginose-pruinose. In all other respects wholly agreeing with the type. Thallus here and there perforate. Spores straight, ·01-·014 x ·004-·005 mm. Lich. Beit. 128.

Hab.: Main Range, near Toowoomba.

ALECTORIA, Ach.

A. australiensis, *C. Knight.* Possesses no gonidia, and is now known to be nothing more than an undeveloped form of the fungus *Marasmius equicrinis*.

TRIBE V.—USNEEÆ, *Th. M. Fries*, Gen. Heter. p. 47.

USNEA, Hffm.

U. barbata, v. asperrima, *J.M.*, is a synonym of *Eumitria Baileyi*, Stirton. Lich. Fl. Queens. p. 26.

TRIBE VI.—PELTIGEREÆ, *J. Mull.*, Lich. Gen. p. 29.

PELTIGERA, Hffm.

P. polydactyla, v. dissecta, *J. Mull.* Thallus as in the type, but the thalline laciniæ at the margins are undulate, minutely and crowdedly microphylline-dissect. Apothecia resemble those of *v. microcarpa*, Ach., of this species. Lich. Beit. 1624.

Hab.: Main Range, near Toowoomba.

TRIBE VII.—PARMELIEÆ, *J. Mull.*, Lich. Gen. p. 31.

STICTINA, Nyl.

S. crocata, v. esorediata, *J. Mull.* s. *S. intricata*, Stirton (non *Del.*). Lich. Fl. Queens. p. 50.

S. brevipes, *J. Mull.* s. *S. marginifera*, Tayl. Lich. Fl. Qd. p. 55.

S. fuliginosa, *Nyl.*, Syn. i. 347. Thallus cervine or cinereo-fuscescent, moderate or small (2-4 inches), stiff, either rather smooth or unequal or sparingly scrobiculate-rugose, slightly shining or almost opaque, monophyllous, variously lobed, lobes rotundate; above somewhat efflorescent with brown or blackish coralloid isidia, beneath pallid; tomentum moderate or little; cyphellæ whitish or pallid; apothecia fusco-rufescent, about 1 m.m., scattered, often when young with margin whitish pilose-ciliate; spores colourless, fusiform, 1-3 septate ·027-·04 x ·007-·008 mm.

Hab.: Mount Mistake.

S. quercizans, *Ach.* s. *S. tomentella*, Leighton (non Humb.) Lich., Fl. Queens. p. 54.

S. suborbicularis, *J. Mull.* s. *S. subtomentella*, Knight, and *S. macrophylla*, Auct. Lich. Fl. Queens. p. 54.

S. Freycinetii, v. isidiosula, *J. Mull.* Thallus roughened over with coarse isidiose granules.

Hab.: Main Range, near Toowoomba.

STICTA, Ach.

S. endochrysea, v. Urvillei, *J. Mull.*, Lich. Hariot e Feuer. s. *S. Urvillei*, Nyl, Lich. Fl. Queens. p. 60. *Fide* J. Mull. L.B. 1303.

S. endochrysea, v. flavicans, *J. Mull.*, Lich. Hariot e Feuer. s. *S. flavicans*, Hook. et. Tayl. Lich. Fl. Queens. p. 61. *Fide* J. Mull. L.B. 1300.

S. variabilis, v. papyracea, *J. Mull.*

Hab.: Main Range, near Toowoomba.

S. Seemanni, *Bab.* Strikingly resembles *S. dichotomoides*, Nyl. in colour of upper and lower surfaces, in laciniation, and in the shape and position of the apothecia; it can, however, be readily separated from its ally by its glabrous under surface, which, in *S. dichotomoides*, Nyl., is tomentose.

Hab.: Main Range, near Toowoomba.

S. impressa, *H. et Tayl.*, s. *S. physciospora*, Nyl., and *S. Bornetii*, J. Mull., Lich. Fl. Queens. p. 63.

PARMELIA, Ach.

GLAUCESCENTES.

P. cetrata, *Ach.*; **v. sorediifera,** *Wainio.* A sorediod form of the lichen thus described by Acharius:—Thallus suborbicular, helvolo-pallescent, nude; beneath black, hispid, lobes sinuate-laciniate, pedate, rather narrow, with broader apex, inciso-crenate, rotundate, ultimate segments retuse, subciliate; apothecia at length dilatate, plane, large, fusco-atrous, imperforate. Syn.—*P. cristulata*, Fee, *P. perforata*, Nyl. (non Ach.), *fide* J. Mull., Lich. Cath. No. 38; *P. macrocarpoides*, Wn., *P. homotoma*, Nyl.

Hab.: Main Range, near Toowoomba.

P. perlata, v. ciliata, *DC.* Differs from the type in the thallus being strikingly nude below, and the margin nigro-ciliate. Spores ·025-·028 x ·014-·017 mm. Spermatia bifusiform ·005 x ·0006 mm. Nyl. Syn. i. 380, and Lich. Ins. Guin. p. 10.

Hab.: Main Range, near Toowoomba.

P. tiliacea, v. sulphurosa, *Tuck.*, s. *P. tiliacea f. asperata*, J. Mull. L.B. 570. Thallus densely and finely isidiose-asperate on the upper surface, strongly resembling *P. tiliacea f. scortea*, but within sulphureous.

Hab.: Main Range, near Toowoomba.

P. tiliacea, v. rugulata, *J. Mull.*, s. *P. caperatula*, Stir. (non Nyl.). Lich. Flor. Queens. p. 45.

P. meizospora, *Nyl.* s. *P. tiliacea, v. meizospora*, Nyl. Lich. Fl. Queens. p. 42.

P. Hookeri, *Tayl.*, resembles *P. tiliacea*, Ach., and *P. lævigata*, Ach., but thalline laciniæ discrete, sinuate incised, and strongly atro-rhizinose. Spores ·008-011 x ·006-·008 mm. Syn.—*P. sublævigata* Nyl., and *P. tiliacea v. sublævigata*, Nyl.

Hab.: Main Range, near Toowoomba.

P. prætervisa, *J. Mull.* s. *P. tinctorum*, Despr. Lich. Fl. Queens. p. 43, and *P. perlata, v. prætervisa*, J.M.

P. tenuirima, *Tayl.* Thallus suborbicular, inciso-lobate, pallid castaneous, margin with undulate lobes, crenate, subelevate, when old rugose, when young unequal; soredia white, filling very short, almost simple furrows; apothecia large, very concave, with thin margin, at length fractured, disk pallid castaneous. Spores ·014-·016 mm. long, ellipsoid or ovoid.

Hab.: Main Range, near Toowoomba.

Ochroleucæ.

P. adpressa, *Kremp.* s. *P. amplexula*, Stirton Lich. Fl. Queens. p. 44.

P. rutidota f. sorediosa, *J.M.* Thallus above everywhere sprinkled over with isidiose soredia, ½ mm. broad or less, hemispherical. Syn.—*P. ochroleuca f. sorediosa*, J. Mull. L.B. 574.

Hab.: Main Range, near Toowoomba.

P. limbata, *Lam.* s. *P. insinuata*, Knight (non. Nyl.). Lich. Fl. Queens. p. 47.

Hypogymniæ.

P. physodes, v. pulverata, *J.M.* Thallus very variable, above usually leprose-pulverulent, beneath always in part whitish or pallid, laciniæ unequal, narrow and broad mixed, the latter 4-6 mm. broad, the former 1½-2 mm. Very nearly approaching *P. physodes, v. mundata*. Syn.—*P. mundata, v. pulverata*, Nyl., *P. subphysodes*, Kremp. Lich. Beit. 577.

Hab.: Main Range, near Toowoomba.

ANAPTYCHIA, Trev.

Separated from Physcia, which it resembles in the structure of the apothecia, by the nature of the cortical stratum, in this genus consisting of a double layer.

A. leucomelæna, *Trev.*, s. *Physcia leucomela*, Lich. Fl. Queens. p. 70.

A. comosa, *Trev.*, s. *Physcia comosa, v. alata*, Wilson, and *Theoloschistes chrysophthalmus, v. alata*, Shirley. See Bot. Bull. No. 2, p. 32, No. 5, p. 32.

A. speciosa, v. sorediosa, *J.M.* Thallus as in the normal form of this species, but the margins of the laciniæ furnished with large subregular or confluent, subfarinose soredia, cilia white; margins of apothecium subentire, smooth. L.B. 582.

Hab.: On bark, Main Range, near Toowoomba.

A. speciosa, v. hypoleuca f. sorediifera, *J.M.*

Hab.: Main Range, near Toowoomba.

PHYSCIA, Fr. pro p.

P. stellaris, v. acrita, *Nyl.* Laciniæ contiguous, in the margin sparingly discrete, the centre often rugose; rhizinæ cinerascent; apothecia with entire margin. Lich. Scand. p. 139.

Hab.: Main Range, near Toowoomba.

Tribe VIII.—PYXINEÆ, *J. Mull.*, Lich. Parag. p. 6.

PYXINE, Fr.

P. endochrysina, *Nyl.* Thallus glaucescent, resting on a black hypothallus, which is more or less revealed between the laciniæ, laciniæ short, sparingly pinnatifid, terminations rounded, bilobate; margins albo-sorediate; under surface blackened; fracture and medulla florescent. Sterile.

Hab.: Main Range, near Toowoomba.

P. Meissneri v. endoleuca, *J.M.* Thallus white within, or whitish, agreeing with *P. Meissneri* in all other respects, the apothecia, when young, being plane and lecanorine, and spores ·017-·021 mm. long. L.B. 118.

Hab.: Mount Gravatt, on rocks.

P. Meissneri f. sorediosa, *J. Mull.* Thallus particularly at the margins of the lobes flavidulo-sorediose. L.B. 118.

Hab.: Main Range, near Toowoomba.

Tribe IX.—PANNARIEÆ, *Korb.* Lyst. p. 105.

PANNARIA, Del.

P. mariana f. isidiosa, *J. M.* L. B. 1159, s. *P. pannosa f. isidioidea*, J. M.

Hab.: Main Range, near Toowoomba.

ERIODERMA, Fée.

Apothecia scutellæform, marginal on the now extended lobes: spores simple, at length colourless. Thallus villous and now veiny beneath, with a pannose hypothallus, the cortical layer there wanting. —*Willey*, Lich. Sp. p. 33.

E. Knightii, *Shirley*, s. *Platysma eriophyllum*, C. K. Lich. Fl. Queens. p. 32.

TRIBE X.—COCCOCARPIEÆ, *J. Mull*, Lich. Schenke.

COCCOCARPIA, Pers.

C. aurantiaca, *Mnt. et v. d. Bosch.* s. *Leptogium cærulum*, Wilson Bot. Bull. No. 2, p. 28.

C. pellita, v. incisa, *J. Mull.* Thallus firm; laciniæ deeply and radiately incised, in outline narrower than in the type; the centre isidiophorous; apothecia badio-fuscous. Syn.—*C. molybdæa v. incisa*, Nyl.; *Obryzum myriopus f. isidiosum*, Wilson Lich. Fl. Queens. p. 9.

C. pellita, v. smaragdina, *J. Mull*, s. *C. smaragdina*, Pers. Lich. Fl. Queens. p. 82.

TRIBE XI.—PSOREÆ, *J. Mull.* (Psorei, *Th. M. Freis.* Gen. Het. p. 79), Lich. Parag. p. 8.

PSORA, *J. Mull*, pro p.

P. parvifolia, v. subgranulosa, *J. M.* Thalline laciniæ, granuliform exiguous, angulose or digitately crenate, incised, cinereo-virescent, beneath very minutely albido-hirsute; apothecia pallid, marginate, within whitish, lamina and hypothecium hyaline or subhyaline. Spores ·011-·012 x ·0025-·003 mm. Differs from v. *granulosa*, Tuck., in the narrow spores, and hyaline hypothecium.

Hab.: Main Range, near Toowoomba.

THALLOIDIMA, J. M.

T. cæruleo-nigricans, *J. Mull*, s. *Lecidea cæruleo-nigricans*, Lghtf. Bot. Bull. No. iv. p. 26.

TRIBE XII.—LECANOREÆ, *J. Mull*, Lich. Socot. p. 359.

LECANORA, Ach.

L. subimmersa, *J. Mull.* (Sp. nov.) Thallus white, medium, granulose-rugulose; surface firm; apothecia ½-2½ mm. wide, the junior ones wholly immersed, plane, outwardly and inwardly black, rather shining and sublecideine, finally slightly emergent and then showing an entire or slightly undulate thalline margin; in other respects this species resembles *L. atra*. The lamina is mostly violet-brown. The spores 8, ·01 x ·006-·0065 mm.

Hab.: Rosewood Scrub.

L. lacteola, *J. Mull.* (Sp. nov.)

Hab.: Main Range, near Toowoomba.

L. subfusca, v. distans, *Nyl.* Thallus whitish, rugulose unequal, determinate; apothecia rufo-pallescent, to 1 mm. or somewhat less, thalline margin entire or obsoletely crenulate; spores 8, ellipsoid, simple, ·015-·018 x ·007-·008 mm.; paraphyses slender.

Hab.: Main Range, near Toowoomba.

L. subfusca, v. testaceo-pallida, *J. Mull.* Wholly resembles *v. chlarona*, but apothecia when moist exhibit a testaceo-pallid colour. L.B. 200.

Hab.: Main Range, near Toowoomba.

L. subfusca, v. cinereo-carnea, *Tuck.* Very similar to the preceding variety, but differs in the colour of the apothecia when moistened; spores ·009-·014 x ·005-·006 mm. Syn.—*Parmelia varia v. cinereo-carnea*, Eschw, *Lecanora leprosa*, Fée.

Hab.: Main Range, near Toowoomba.

L. atra, v. virens, *J. Mull.* Thallus greenish olivaceous, when moist intensely or obscurely green. L.B. 495.

Hab.: Main Range, near Toowoomba.

L. interjecta, *J. Mull*, s. *L. umbrina*, Stirton (non *Nyl.*) Lich. Fl. Queens. p. 89.

CALLOPISMA, De Not.

C. cinnabarinum, v. opacum, *J. Mull.* Thallus ferrugineous, opaque. L.B. 333.

Hab.: On rocks, Mount Perry.

C. conjungens, *J. Mull.* Thallus white, thin; apothecia ferrugineo-rufous, or rubenti-ferrugineous, 1-1·5 mm., girdled by a depressed or almost obsolete thalline margin; spores ·011-·016 x ·007-·009 mm. Differs from *L. russeola* in the entire thalline margin. Lich. Nov. Gran. p. 442.

Hab.: Sandgate.

PERTUSARIA, DC.

Lecanorastrum.

P. sulphurata, *J. Mull.* Thallus sulphureo-stramineous or stramineo-pallid, slightly granose-rugose, rugulæ crowdedly subdiscrete; verrucæ ·7-1 mm.; as very small hemispheres, slightly convex, when sterile usually truncate and sulphureo-pulverulent. Apothecia unknown.

Hab.: On rocks near Brisbane.

P. globulifera, *Nyl.* Thallus greyish, cartilagineo-membranaceous, verrucose-rugose, albo-sorediate, smooth, zonate and brown at the circumference; verrucæ large, globular, closed, slightly depressed, lycoperdoid, eventually lacerato-dehiscent, and pseudo-scutelliform, albo-sorediate; spores 1 or 2, colourless, ellipsoid, simple, large.

Hab.: Main Range, near Toowoomba.

P. commutata, *J. Mull.* Closely resembles *P. multipunctata*, but the disk of the apothecium is carneous or rosellate, as in *P. velata*. It differs from *P. subvaginata*, Nyl., in the smaller verrucæ, which are neither shortly cylindrical nor distinctly constricted. The thallus is commonly rimose-diffract, and often more or less papillose-exasperate; when young it is olivaceous, but afterwards strongly albescent. At all stages it is less white and less smooth than *P. velata*.

Syn.—*Variolaria amara*, Fee; and *v. fulva* Fee is v. *variolosa*, *J. Mull.* L.B. 706, and Rev. Lich. Fee. p. 4.

Hab.: Main Range, near Toowoomba.

Porophora.

P. (Pustulatæ) lactea, *Nyl.*, s. *P. sorediata*, C.K. Lich. Fl. Queens. p. 99.

P. (Depressæ) depressa, v. octomera, *J. Mull.* Thallus albido-cinereous, thin, smooth or smoothish; verrucæ hemispherical, solitary or 2-3-confluent, outline often regularly orbicular and the base

clearly circumscripto-distinct, and not gradually passing into the thallus, smooth or smoothish, apex depressed, in the depression crowdedly 1-many-ostiolate; ostiola nigricant or atro-olivaceous, finally often maculari-confluent, stoutish; spores 6-8, ·07-·085 x ·055-·06 mm., within smooth.

Syn.—*Porina depressa*, Fée.

Hab.: Main Range, near Toowoomba.

P. (Depressæ) undulata, *J. Mull.* Thallus and verrucæ slightly florescent-albid, in places thin, rugulose, finally rimose; verrucæ 1 mm. wide, depresso-hemispherical, in base undulate, 3-5-gibbose, surface smooth, towards the base merging into the thallus; vertex at first obtuse, then subexcavate-depressed and adorned with brownish or colourless ostiola; spores 8, ·06-75 x ·027-3 mm., within smooth.

Hab.: Toowoomba, on bark.

DIPLOSCHISTES, Norm. Mag. naturvid. vii. 1853 p. 232.

D. actinostomus, *Zahl.*, s. *Urceolaria actinostoma*, Sch.; *U. noræ-zealandiæ*, C. K.; *U. plumbata*, Wilson (in lit.); *Lecidea clausa*, C. K., Lich. Fl. Queens. p. 123.

Tribe XIII.—GYALECTEÆ, *J. Mull.*, Lich. Parag. p. 12.

GYALECTIDIUM, J. Mull.

Thallus crustaceous; gonidia globose, green; apothecia lecanorine, margin simple, outwardly thalline. Paraphyses clathrately connected. Spores hyaline, parenchymatous. Differs from Gyalecta in the structure of the paraphyses.

G. phyllocharis, *J. Mull.*, s. *Lecidea phyllocharis*, Mnt. Lich. Fl. Queens. p. 115.

G. filicinum, *J. Mull.* Thallus suborbicular, small, very thin, cinereo-virescent, rather shining, more or less granulate, margin subeffused or concolorous; gonidia globose, 5-8 μ wide; apothecia $\frac{1}{2}$ mm. or slightly larger, crowded, slightly depressed, thickly marginate, and at first innate-lecanorine, margin outwardly somewhat gibbose-unequal, and gradually disappearing in the thallus, within white, disk pallid fuscescent, nude; lamina wholly hyaline, tough; paraphyses strikingly slender; asci 1-spored; spores ·03-·035 x ·012-·016 mm., transversely about 12-septate, longitudinally 3-5-septate. L. B. 253.

Hab.: Main Range, near Toowoomba.

Tribe XIV. LECIDEÆ, *J. Mull.*, Enum. Lich. Genéve p. 50.

LECIDEA, Ach.

Eulecidea.

L. albo-cærulescens, *Wulf.*, s. *L. subnubila*, Stirton. Lich. Fl. Queens. p. 108.

Biatora.

L. impressa, *Kremp.*, s. *L. plumbeella*, J. Mull., and *Lecanora* (*Aspicilia*) *lævissima*, C. K. Lich. Fl. Queens. p. 91.

L. piperis, *Spreng.*; **v. melanocarpa,** *J. Mull.* Thallus fuscescent; apothecia from the first black or blackish; hypothecium thick, rufo-fuscous. Rev. Eschw. p. 16. Syn.—*L. sabuletorum* v. *brasiliensis*, Eschw.

Hab.: Mount Mistake and Rosewood Scrub.

PATELLARIA, J. Mull.

Sect. Psorothecium.

P. melaclina, (Nyl.) *J. Mull.*

Hab.: Main Range, near Toowoomba.

Sect. Catillaria.

P. alboflavicans, *J. Mull* (sp. nov.). Thallus thin, rimulose or at length diffracto-areolate, at first, however, continuous, outline effuse; apothecia ·7-1·5 mm., appressed-sessile, at first plane and thinly margined, then finally convex and immarginate, rather thin, wholly black and nude, opaque; epithecium olive black; hypothecium atro-fuscous; spores ellipsoid-fusiform, rather incurved, equally bilocular, ·012-5 x ·005-7 mm.

Hab.: On rocks near Brisbane; and Mount Mistake.

Sect. Bacidia.

P. intermixta, *J. Mull.* Thallus thin, white, effuse, soon scurfy and granulate, and now sorediiferous, ashy green and fuscescent or evanescent; apothecia small, adnate, brownish, flattish, pale within; border obtuse or wanting; spores ellipsoid, 1-septate, ·012-·023 x ·004-·008 mm. Tuck. North Am. Lich. pp. 30, 31.

Hab.: Helidon, on bark.

P. millegrana, *J. Mull.* Thallus whitish, subdeterminate, granulate-rugose; apothecia pallid, carneous, or carneo-fuscescent, to about 1 mm., plane or rather convex, marginate, margin commonly pallid or pallid whitish; spores 9-27 septate, ·06-114 x ·0045-·005 mm.; paraphyses slender. s. *P. heterochroa*, J. Mull.

Hab.: Main Range, near Toowoomba.

P. millegrana, v. fusco-nigrescens, *J. Mull.* Apothecia with fuscous or fusco-nigrous epithecium, and spores ·08-·087 x ·0045-·0055 mm. s. L. fusco-nigrescens, *Kremp.*

Hab.: Main Range, near Toowoomba.

BUELLIA, De Not.

B. lactea, *Korb.*, s. *Lecidea saxatilis*, Stirton (non *Schaer.*) Lich. Fl. Queens. p. 121.

B. subareolata, *J. Mull*, Lich. Parag. 130. Thallus rather thin, cinereo-flavicant, margin effuse, in other parts continuous, finally towards the margin rimose-areolate or spuriously areolate, surface sub-unequal; spurious areolæ plane, not at all polished; apothecia appressed-sessile, black, nude, ·05-·08 mm. wide; plane, thickly margined, margin somewhat atro-fuscous; epithecium, rufo-fuscous; hypothecium, a deep brown; spores 8, biseriate, 2-locular, ·016-8 x ·007-8 mm.

Hab.: Mount Mistake.

B. subarenaria, *J. Mull.* (sp. nov.).

Hab.: Hill End, on rocks.

B. rimulosa, *J.M.*, Lich. Beit. 1442. Thallus white, limitate, thin, smooth, continuous, usually crowdedly areolate-rimulose, not diffract; areolæ contiguous, very small; apothecia ·3 mm. wide, at first immersed and often spuriously thalline margined; epithecium fusco-nigrous; hypothecium above fusco-subhyaline, below in thick stratum rufo-nigricant; paraphyses at the apex strongly clavate; spores 8, 2-locular, ·009-11 x ·0045-5 mm., the centre scarcely constricted.

Hab.: Main Range, near Toowoomba.

HETEROTHECIUM, Flot. (pro p. Mass.).

Thallus crustaceous, gonidia commonly globose; apothecia (biatorine) lecideine, paraphyses not connexo-ramose; spores muriform and hyaline. Lich. Beit. 260.

H. vulpina, *Tuck.*, s. *L. domingensis v. gyrosa*, Stirton Lich. Fl. Queens. p. 117.

H. fusco-luteum, *J. M.*, s. *L. fusco-lutea*, Dicks, Lich. Fl. Queens. p. 115.

Tribe XV.—CŒNOGONIEÆ, *J. Mull.*, Lich. Parag. p. 18.

Gonidia confervaceous; apothecia lecideine-biatorine.

CŒNOGONIUM, Ehrenb.

C. confervoides, *Nyl.*, s. *C. interpositum*, Nyl. Lich. Exot. p. 259. Thalline filaments ·012-8 mm. thick. Prod. Lich. Nov. Gran. p. 456.

Hab.: Mount Mistake.

Tribe XVI.—THELOTREMEÆ, *J. Mull.*, Graph. Fée p. 5.

OCELLULARIA, J. Mull.

O. leucotylia, *J. Mull.* Thallus whitish, rather shining, rugulose, thin or very thin, indeterminate, apothecia colourless, enclosed in white, opaque, subglobose, finally rotundate-difform thalline tubercles; ·9-1·4 mm.; above unequal, the corneo-nigricant epithecium showing; spores 8, colourless, oblong, 4-6 locular, ·014-8x ·006-7 mm. Lich. Andam. p. 7.

Hab.: Bellenden-Ker.

O. phlyctioides, *J. Mull.* Thallus somewhat clayey whitish, thin, smooth and opaque, continuous; apothecia 1 mm. in outline undulate-irregular, slightly emergent; margin rather thick, patent, stellately aperient, then incomplete or obliterate, the interior one white, at first connivent, then radiately dehiscent, finally wide open; disk depressed, plane, albo-pulveraceous; lamina aquose-hyaline; hypothecium florescent-hyaline; spores 5-8, hyaline, ·013-7 x ·005-6 mm., elongate-ellipsoid, 4-6 locular.

Hab.: On bark, Brisbane.

O. endomelæna, *J. Mull.* Thallus chalky-white, thin, smooth, rather powdery; apothecia ·3-·7 mm., innate-emergent, concolorous with thallus, the emergent part depressed, hemispherical, towards the base disappearing in the thallus; margin obtuse, within subangulose, apex white, elsewhere fusco-nigrous; disk very little disclosed, nearly black; spores 8, ·03-34 x ·008-9 mm, 8-9 locular.

Hab.: On bark, near Brisbane.

PHÆOTREMA, J. Mull.

P. cricotum, *J. Mull.*, s. *Ocellularia cricota*, Wilson, *fide* Mull. Arg.

LEPTOTREMA, J. Mull.

L. compactum, *Nyl.* Given in L.B. 1184, as a Queensland lichen, with reference to *Nyl.* Prod. Nov. Gran., p. 46. No such plant is named in the Prodromus, and *L. compunctum* is evidently intended.

THELOTREMA, Ach.

T. inturgescens, *J. Mull.* Thallus stramineo-cinerascent, thin, from continuous and smooth, usually areolate-rimose; areolæ strongly inturgescent, and as if bullate-multigibbose; surface smooth, many fruited; apothecia profoundly innate, globose, to ·4 mm., apex with very narrow, ·05, ostiolum; perithecium within fulvescent; spores hyaline, solitary, ·27 x ·04, closely parenchymatous.

Hab.: On bark, near Brisbane.

T. cupulare, *J. Mull.* Thallus obscurely olivaceous, very unequal, firm, cartilaginous, shining; apothecia erumpent, usually wide, cupular, deeply concave; margin opening widely, at first stellate-patent or recurved, then subobsolete, and with the disk albo-farinose, the interior wholly albo-hyaline; spores 8, ·015-7 x ·005-6 mm., 6- locular, middle loculi, 2-locellate.

Hab.: On bark, Brisbane.

Tribe XVII.—GRAPHIDEÆ, *J. Mull.*, Graph. Fée pp. 4 and 13.

Sub-Tribe I.—Eugraphideæ, *J. Mull.*

OPEGRAPHA, Nyl.

O. Bonplandi, v. abbreviata, *J. Mull.*, Graph. Fée p. 17. Lirellæ much abbreviated; spores ·03-·045 x ·0035-·0045 mm., narrow fusiform, 7-9 septate, often from hyaline finally olivaceo-obscure.

Hab.: Main Range, near Toowoomba.

O. varia, v. diaphora, *Nyl.* Thallus white, pulverulent; lirellæ elongate, attenuate at both extremities, epithecium plane; proper margin persistent, flexuose; spores 8, colourless, irregularly obovate or obovate-fusiform, 5-septate, ·024-6 x ·007 m.m. Leighton Lich. Fl. Gt. Brit. pp. 404-5.

Hab.: Mount Mistake.

O. vulgata, v. subsiderella, *Nyl.* Thallus greenish-white, cartilagineo-membranaceous, cracked and scaly, effuse; lirellæ prominent and sessile, radiate-ramose, wavy and shining or greasy; epithecium rimiform, uniform; proper margin thick, very round and inflexed; spores 8, colourless, fusiform, 5-septate, ·015-·02 x ·003-4 mm. Leighton Lich. Fl. Gt. Brit. p. 407.

Hab.: Rosewood Scrub.

O. (Lecanactis) platygraphoides, *J. Mull.* Thallus cinerascent-whitish, thin, closely areolate-rimose; gonidia chroolepoid, with elliptical joints; apothecia 1-2 mm., sessile, orbicular, thick, obtusely crasso-marginate, more or less provided with a thalline coating, and in part girded with a thin, white fugaceous thalline margin, beneath which it is brown; at length undulate, irregular, and

accrescent, 2·5-3 mm., proper margin as if an elongation of the periphery of the thick nigro-fuscous hypothecium; disk plane, when young albido-pruinose; spores 8, hyaline, subclavate, narrow below, ·03-35 x ·004-5 mm., 4-locular.

Hab.: On bark, near Brisbane.

GRAPHIS, J. Mull.

G. emersa, *J. Mull.* (sp. nov.). Thallus indicated by a white halo; lirellæ sessile-emergent, 1-2·5 mm. long and ·2 mm. wide, wholly simple and straight, differing in direction, wholly black and nude, linear, thickish, constricted towards the base; lips closely connivent, not at all sulcate; perithecium at the base complete, everywhere black; spores 8, hyaline, ·03 x ·008 mm., fusiform, 9-10 locular.

Hab.: Mount Mistake.

G. (Eugraphis) Lineola, *Ach.*, Syn. p. 80. Thallus rather soft, smooth, whitish, subpruinose; apothecia scattered, very slender, long, straitish, simple, bordered by a tumid spurious thalline margin, at length emergent, sessile, cylindrical, disk subrimiform. Syn.—*G. comma*, Mass., and Nylander in Prod. Nov. Gran. p. 73.

Hab.: Cleveland.

G. (Aulacographa) duplicata, *Ach.*, Syn. p. 81. Thallus thin, white, subdeterminate; apothecia rather prominent, elongate, straight, and flexuose; disk rimiform, margin of perithecium at length duplicate; thalline margin nearly wanting; spores ·02-5 x ·007-·01 mm.

Hab.: Main Range, near Toowoomba.

G. duplicata, v. sublævis, *J. Mull.*, Graph. Fée. p. 35. Lirellæ entire, or a few with lips longitudinally 1-sulcate. *Syn.—G. striatula v. sublævis*, Nyl, *Opegrapha peruviana*, Fée.

Hab.: Rosewood Scrub.

G. (Fissurina) insidiosa, *J. Mull.* Thallus thick, uneven, warty, dull green, brownish when dry; apothecia crowded, deeply immersed in warts of the thallus, simple or branched, closed; lips paler; spores 1-seriate, ovoid or obovate, yellow, ·017 x ·0075 mm., 3-septate.

Hab.: Main Range, near Toowoomba.

G. Baileyana, *J. Mull.* (sp. nov.). Thallus ochroleuco-albid, thin, smoothish or obsoletely rugulose, at length rimulose, widely effuse; lirellæ linear, branched and subflexuose, at length wide, varying much in outline, attaining 5 mm. by 1 mm., broadly or narrowly elliptical, when young thalline marginate, finally subimmarginate and plane, thin; disk when dry clothed with a pruinose leaden-white stratum, when moist obscurely fleshy; within hyaline; spores 3-4, ·045-75 x ·008-·01 mm., 12-18 locular.

Hab.: Main Range, near Toowoomba.

GRAPHINA, J. Mull.

G. pyelodes, *Wilson*, Bot. Bull. 7 p. 32, is *Phæographina quasiæcola*, J. Mull., s. *Graphis exserta*, Nyl.

TREMOTYLIUM, J. Mull.

T. nitidulum, *J. Mull.* Thallus whitish, thin, rimulose, rather smooth and shining, with numerous stromatiform verrucæ, elongate

but irregular and deplanate, gradually uniting with the thallus; verrucæ smooth and finely verruculose, furnished with very small, not at all numerous, non-emergent ostiola; perithecium olivaceous within the apex, elsewhere hyaline; spores solitary, hyaline, ·2 x ·04 mm., linear ellipsoid, parenchymatous.

Hab.: Brookfield, on bark.

ARTHOTHELIUM, J. Mull.

A genus differing from *Arthonia* in its parenchymatous spores.

A. puniceum, *J. Mull.* Thallus obsolete; apothecia stellately erumpent from the epidermis, to 1 mm. wide, blood red, nude, flat, orbicular or slightly angulose, often faintly powdery, when evolute superficial, and girdled with the torn, purplish epidermis; perithecium wanting; hypothecium olive-brown, thin; lamina hyaline, paraphyses rigid, not separable, sparingly connected; spores 8, hyaline, ·023-6 x ·009-·01 mm., 6-locular, the four central ones 2-3-locellate.

Hab.: Brookfield, on bark.

Sub-Tribe II.—Glyphideæ, *J. Mull.*, Graph. Fée pp. 4 and 61.

CHIODECTON, Ach.

C. sphærale, *Ach.* s. *C. stromaticum*, C.K. Lich. Fl. Queens., p. 157.

C. (Enterographa) endoleucum, *J. Mull.* Thallus whitish, thin, usually closely rimulose, and finally rimose-granular, outline effuse, neither zonate nor byssoid, but at length albo-farinulent; stromata in the part emerging either suboblong and irregular or convex and hemispherical, white mealy, within white, above with many scattered perithecia; ostiola 2, orbicular or elliptical, black and nude; perithecium above and at the sides thinly browned; spores 8, ·026-35 x ·0035-5 mm., arcuate, at both ends obtuse, 4-locular.

Hab.: Toowoomba, on bark.

SARCOGRAPHA, J. Mull.

S. actinota, *Wilson*, is *Sarcographa subtricosa*, J. Mull., Bot. Bull. 7 p. 33.

Tribe XVIII.—Strigulæ, *J. Mull.*, Pyr. Cub. p. 378.

STRIGULA, Fries.

S. elegans, v. eumorpha, *J. Mull.*, L.B. 919. Plagulæ 1½-2 mm. in diameter, formed of 3-5 rays connate in the centre, discrete beneath, each composed of branchlets by 2-3-dichotomous division, the whole of the lacinulæ shortly linear, convex, glabrous, from florescent to whitish-green; pycnides $\frac{1}{10}$ mm. wide, nude; stylospores ·017 mm. long, baculiform, bilocular.

Hab.: North Pine River.

S. elegans, v. pertenuis, *J. Mull.* (var. nov.). Lacimæ subflabellately branched, here and there, in spaces, simple or only rudimentarily branched, branchlets ·04-·05 mm. wide, vesiculose-cellulose and here and there rudimentarily provided with cilia.

Hab.: North Pine River.

Tribe XIX.—PYRENULÆ, *J. Mull.*, Pyr. Cub. p. 381.

Sub-Tribe I.—Astrotheliæ, *Trev.*, Syn. Gen. Try. p. 22.

PARMENTARIA, Fée.

P. astroidea, *Fée.* Thallus hypophlœodal, the epidermis olivaceo-pallid, very thin; apothecia emergent but closely clothed by the thin cortex, when they are impurely nigricant, 2-3-4 in little heaps, or often 5-6 connate in stars, resting on a common black base, each hemispherical prominent, 1-5 fruited with common ostiolum; nucleus somewhat flavicant or pallid; paraphyses crowded, capillary; asci linear 2-4-8-spored; spores hyaline or olivaceous, at length brown, ·024-35 x ·011-6 mm., murali-locular in 8 x 4 ranks. Syn.—*Heufleria pentagastrica*, J. Mull., *Verrucaria astroidea*, Fée, *Pyrenastrum Americanum*, Sp.

Hab.: Main Range, near Toowoomba.

Sub-Tribe II.—PLEUROTHELIEÆ, *J. Mull.*, Pyr. Cub. p. 387.

PARATHELIUM, Nyl., Bot. Leit. 1862 p. 279.

P. decumbens, *J. Mull.* (sp. nov.). Thallus whitish, at first smoothish, then only a mere vestige, finally evanescent; apothecia black, long-necked, decumbent-adnate and rather innate, at first thalline-subvelate, usually the emergent part nude; perithecium with thin neck, globose, ·7 mm., wanting beneath; spores 8, oblong-ellipsoid, 4-locular, ·02 x ·01 mm.

Hab.: On bark, Toowoomba.

Sub-Tribe III.—VERRUCARIEÆ, *J. Mull.*, Pyr. Cub. p. 398.

PORINA, J. Mull., L.B. 644.

P. phæophthalma, *Shirley*, Lich. Fl. Qd., June, 1889; s. *P. brisbanensis*, J. Mull., Lich. Brisb. 1891.

CLATHROPORINA, J. Mull., L.B. 541.

C. olivacea, *J. Mull.*, s. *Porina enteroxantha* C.K. Lich. Fl. Queens. p. 171.

C. desquamans f. sorediosa, *J. Mull.* (var. nov.). Soredia rather numerous, patelliform, ·5-·7 mm., evenly truncate, margin acute, the disk covered with a very pale golden dust.

Hab.: On bark, Brisbane and Toowoomba.

ARTHOPYRENIA, J. Mull., L.B. 612.

A. Cinchonæ, *J. Mull.* Thallus effuse, very thin, whitish, flavidulous or alboglaucescent, evanescent; apothecia convex-conoid, rugulose, papillate, ostiolate-impressed; the nucleus from albicant when dry to nigro-fuscescent when moist; perithecium dimidiate, base spreading; spores ·01-·025 x ·006-7 mm., 2-locular.

Hab.: Main Range, near Toowoomba.

POLYBLASTIA, J. Mull., L.B. 490.

P. nudata, *J. Mull.* (sp. nov.) Thallus white-spotted, very thin, rather smooth, shining; apothecia ·5 mm., almost equal in every

diameter, hemispherical-convex, at first whitish clouded, usually at length nude and rather polished, almost wholly emersed; perithecium incomplete beneath; asci broad; spores 8, broadly or narrowly ellipsoid, ·03-35 x ·02 mm., 8-locular, with 4 transverse locelli in each loculus.

Hab.: On bark, near Brisbane.

PYRENULA, Fée Ess. Supp. p. 76.

P. bicuspidata, *J. Mull.* (sp. nov.). Thallus nigrescent-olivaceous, smooth; apothecia ·7 mm., black, twice as broad as high, semi-emergent, but thalline velate, and finally blackish, thickly scattered, regular; perithecium flat below, very thin at the base, but complete, the sides curving to the base; spores 8, ·04-47 x ·01-12 mm., 4-6 locular, at both ends cuspidate-acuminate.

Hab.: On bark, near Brisbane.

P. marginata, *Trev.* Thallus as in *P. convexa*, J. Mull., greenish-yellow, membranaceous, desquamescent, subverruculose, margin shining, undulate broad, fuscescent, limitate; apothecia globose, depressed, as if alato-marginate; perithecium sub-globose, complete, everywhere equally thick; ostiolum large, solitary, papilliform, brownish red; spores fuscescent, 4-locular, ellipsoid, ·027-·04 x ·01-·018 mm.

Hab.: Rosewood Scrub.

P. Kunthii, *Fée.* Differs from *P. marginata*, Trev., in the slightly smaller apothecia, and the narrower spores, ·007-·011 wide.

Hab.: North Pine River.

P. pinguis, *Fée.* Thallus from pallid olivaceous, usually albicant, smooth, very thin; apothecia innate, revealed by the black punctiform ostiolum, the vertex widely denudate, but only slightly emergent; perithecium globose, complete, black, everywhere thickish, ·6 mm. wide; spores in linear asci, 8, 1-seriate, brown, 4-locular, ·035-·04 x ·015-8 mm., oblong-ellipsoid. *Verrucaria punctella*, Nyl.

Hab.: Main Range, near Toowoomba.

P. nitida, *Ach.* Thallus cartilagineo-membranaceous, levigate, from pallid fusco-cinerascent; apothecia in glabrous-closed verrucæ, which are prominent, nude, rugulose, perforate with depressed ostiola; spores 4-locular, ·018-·032 x ·009-·015 mm.

Hab.: Main Range, near Toowoomba.

ANTHRACOTHECIUM, Mass. Esam. Comp. p. 49.

A. confine, *J. Mull.* Thallus white or whitish, opaque, thin, bordered by an obscure line; apothecia mastoid, rather prominent, clothed by the thallus; ostiolum punctiform, black, at length denudate; perithecium thin, entire, black; spores 8, fuscescent, ellipsoid, muriloocular in 8 x 4 rows, ·011-·02 x ·007-·011 mm.

Hab.: Main Range, near Toowoomba.

A. Doleschalii, *Mass.* Thallus cinerascent, as a thin frosting; apothecia large, 1·5 m.m., ovate, black, cinereo-suffused, flattened, little emergent, fixed singly in areolate plates of bark; ostiola large, black, at length delapsed; spores ·02-·028 x ·009-·012 mm.

Hab.: Main Range, near Toowoomba.

Order FUNGI.

AGARICUS, Linn.

A. (Lepiota) membranaceus, *Cke. and Mass.*, Grev. xxi. 36. Pileus thin, membraneous, pale cream colour, convex, then expanded, umbonate, a little darker at the disc (1 to 2 cm.). Stem slender, slightly bulbous at the base, hollow; ring distant, small, rather fugacious. Gills free, ventricose, scarcely crowded. Spores very minute, 3 x 2 μ.—*Dr. M. C. Cooke, l.c.*

Hab.: On wood, Brisbane River, *Field Naturalists.*

Noticed in Botany Bulletin V., but wanting description.

A. (Collybia) muscipula, *Cke. and Mass.* (n. sp.).

Hab.: A solitary specimen received from Dr. Joseph Bancroft. The description has not yet come to hand; but Dr. Cooke, in letter, remarks that this new species is very similar to *Ag. radicatus*, Relb. It will be seen by referring to the 3rd Supplement to Syn. Queens. Fl., p. 114, that this latter species was met with a few years ago near Brisbane.

A. (Collybia) nummularis, *Fries.*, Cooke's Austr. Fung. 20. Pileus rather fleshy, almost plane, obsoletely depressed around the umbo, even, pallid; stem stuffed, then hollow, smooth, pallid, incrassated above; gills free, rather distant, white.—*Cooke, l.c.*

Hab.: Gladfield, on wood, *C. J. Gwyther*; also in Victoria.

A. (Collybia) dryophilus, *Bull.*, Cooke's Austr. Fung. 20. Pileus somewhat fleshy, nearly plane, obtuse, rather depressed, even, smooth, turning pale (1-2 in. diameter); stem fistulose, smooth, reddish-brown or yellowish (2 to 3 in. high, $\frac{1}{4}$ in. thick); gills sinuate, adnexed, at length with a decurrent tooth, nearly free, crowded, narrow, white or pallid; spores 6 x 4 μ. *Cooke, l.c.* (but no *habitat* given).

Hab.: On the earth, Gladfield, *C. J. Gwyther.*

A. (Mycena) epipterygius, *Fries.* Cooke Illust. t. 208 a. Pileus membranaceous, campanulate, then expanded, rather obtuse, striate, cuticle viscid, separable; stem elongated, tough, rooting, smooth, viscid, yellowish; gills adnate, with a decurrent tooth, variable in colour.—*Cooke, l.c.*

Hab.: Gladfield, *C. J. Gwyther.*

Found amongst moss and leaves in Europe.

A. (Pleurotus) cyphellæformis, *Berk.*, Mag. Zool. and Bot. i. t. 15 f. 3; *Cooke*, Ill. t. 244 b.; *Sacc.*, Syll v. 379. (From *cyphellæformis*—shaped like the hollows of the ears, *cyphellai.*) Pileus cup-shaped, then dependent; upper stratum gelatinous, cinereous, very minutely strigose, especially at the base; margin paler, sprinkled with a few meal-like scales; gills pure white, rather distant, narrow, linear. A weak, gregarious species about 4 mm. high.

Hab.: On moss, Gladfield, *C. J. Gwyther.*

Found in Europe on the dead stems of herbaceous plants.

MARASMIUS, Fries.

M. pilopus, *Kalch.*, Grev. viii. t. 143, f. 13; *Sacc.* Syll. v. 2014; *Cke.*, Austr. Fungi 83. Pileus between coriaceous and membranaceous, almost diaphanous, convex, obtuse, or with the centre depressed

(scarcely 1 in. broad), wholly radiately striate, gilvous, becoming pale; stem stuffed, then hollow (1 to 2 in. long, 1 line and more thick), somewhat bulbous at the base, invested wholly with a powdery ochraceous brown tomentum; gills adnate, very broad behind, narrower towards the margin, distant, branched, edge entire, red flesh colour when dry; spores oval ($2\frac{1}{2}$ x $1\frac{1}{2}$ μ).—*Cooke, l c.*

Hab.: Near Warwick, *C. J. Gwyther.*

First found on wood in N.S.W.

M. putredinis, *Berk.*, Cooke in Austr. Fung. 86. Pileus plane, thin, smooth, reddish-yellow or grey ($1\frac{1}{2}$-$2\frac{1}{2}$ c.m. diam.); stem of the same colour (18 mm. long, 1 mm. thick), solid, equal, smooth; gills narrow, adnate, white, then turning yellowish.—*Cooke, l.c.*

Hab.: Gladfield, on wood, *C. J. Gwyther;* also found in Victoria.

M. badius, *Berk. and Curtis*, Cuban Fung. in Journ. Linn. Soc. x 294. Pileus reddish when fresh, convex, striate; glabrous, the margin incurved, stem primose glabrescent, gills ventricose, distant, smooth, adnate, thick rounded at the back, interstices smooth.

Hab.: On wood, Gladfield, *C. J. Gwyther.*

First found on bark amongst moss at the Island of Cuba.

M. rhyssophyllus, *Mont.* in Berk. and Curtis, Cuban Fung. Journ. Linn. Soc. x. 294. Pileus fibrous, glabrous pale yellow, stem same colour, glabrous, with a strigose base, gills distant, interstices trabeculate, yellow.

Hab.: Gladfield, on wood, *C. J. Gwyther.*

First found at Guiana.

ARRHENIA, Fries.

Membranaceous tender fungi. Hymenium inferior, lamellæ consisting of a few slender slightly raised veins in simple straight striæ. Spores pale, minute, fairly persistent, various in shape. Striæ not decurrent.—*Sacc.*, Syll. v. 498.

A. (Apus) cupularis, *Fries., Sacc.*, Syll. v. 499. (*Cantharellus cupularis*, Fries.) Resupinate, soft, orbicular, exterior smooth villose, grey with simple centrifugal folds.—*Sacc.*, Syll. l.c.

Hab.: On a young pinnate leaf received from E. Cowley, Kamerunga.

This species is met with on rotten wood in Europe.

POLYPORUS, Fries.

(Ovini.)

P. Mylittæ, *Cke and Mass.*, Grev. xxi. 37. Pileus fleshy, tough, elastic, pulvinate, single or two or three together, and then deformed, convex, minutely velvety, white (10 cm. diam.) Stem short (2 cm. long), deformed like the pileus, solid, flesh white. Tubes rather long (7 mm.). Pores white, adnate ($\frac{1}{2}$ mm.), somewhat angular, edge acute, smaller towards the margin. Spores elliptical, with an oblique basal apiculus, smooth, 8 x 4 μ. The ultimate development of the *Sclerotium—Mylitta australis.*

Hab.: The *Sclerotium* has often been met with in Queensland, but the fully developed plant has not as yet been observed. *P.* (*Ovini*) *tumulosus*, Cke., found by Dr. J. Bancroft, near Burpengary, is a closely allied plant, having similar habit.

(PETALOIDES.)

P. grammocephalus, *Berk.*; **var. minor,** *Cooke.* (Description of this variety not to hand.)

Hab.: On wood, Eumundi, *Field Naturalists.*

P. infernalis, *Berk.*, Hook. Journ. 1843; Sacc. Syll. Fung. vi. 83; Cooke's Austr. Fung. 116. Pileus flabelliform, entire or rather lobed, depressed behind, thin, acute, at length corky, coriaceous, quite smooth, even, striately rugulose except at the base, blackish liver coloured (8-9 c.m. broad), stem short, lateral, black, thickened upwards, punctate, pulverulent (1-2½ c.m. long, 1 c.m. thick), hymenium brownish; pores minute, round, very short; margin sterile.—*Cooke, l.c.*

Hab.: Gladfield, *C. J Gwyther.*

This species was first met with in Brazil; since it has been found in Victoria, now in Queensland.

P. phlebophorus, *Berk.*, Fl. N. Zeal.; Sacc. Syll. Fung. vi. 91. Small, white, pileus flabellate, about 25 mm. broad and long, stem short, glabrous, veined, undulate, cuticle gelatinous; pores minute, subirregular, with thin toothed dissepiments.

Hab.: On stems of *Eucalyptus hemiphloia,* at Port Curtis, *Hon. A. Norton.*

Only before known from New Zealand.

FOMES, Fries.

F. cryptarum, *Bull.*, as *Boletus cryptarum, Polyporus undata,* Pers.; Sacc. Syll. Fung. vi. 205. Pileus suberoso-stupose, effuso-reflexed, appressed-silky, colour reddish-ferruginous, but variable both in colour and form; pores minute, pale, rounded.

Hab.: On log in Bowen Park bush-house.

Found on rotten pinewood in Europe.

CYPHELLA, Fries.

C. longipes, *Cke. and Mass.*, Grev. xxi. 38. Tobacco-pipe Fungus, Gregarious, membranaceous, white. Pileus narrowly infundibuliform, 2 mm. broad, 4 mm. long, attenuated downwards into a long thin curved stem, 5 mm. to 1 cm. long, wholly smooth, thickest above, as it passes imperceptibly into the pileus. Spores pip-shaped, 7 x 6 μ.—*C. and M. l.c.*

Hab.: Brisbane River scrubs, on the rough bark of living trees, *Field Naturalists.*

The description wanting in Bot. Bulletin V.

CYATHUS, Hall.

C. Baileyi, *Massee.*, Grev. xxi. 3. Peridium obconic or campanulate, at maturity widely open above, and with the margin slightly revolute, thin, and cartilaginous, minutely tomentose externally, cinnamon-colour, glabrous and greyish-cinnamon inside, ⅔ to 1 cm. high; sporangiola 8 to 12 in number, biconvex, very smooth, grey, then black and shining, about 2 to 2·5 mm. diameter; spores subglobose, colourless, 18 to 20 x 15 to 16 μ. More or less gregarious. Basidia bisporous, clavate, apex truncate, sterigmata elongated, slender.—*Mass. l.c.*

Hab.: On dung, Brisbane.

PHYSARUM, Pers.

P. didermoides, *Ach.*, Rost. Mon. Sacc. Syll. Fung. vii. 338; *Spumaria didermoides*, Fries; *Didymium congestum*, B. and Br. Forming crowded patches very much resembling those of *Diachæa elegans*; Peridia obovate-oblong, cinereous, with a white mealy coat; stems hyaline, membranaceous, generally distinct, though crowded, springing from a thin subjacent membrane. Spores black, variegated with the white coarse, irregular, here and there lacunose flocci. The globose spores appear at first sight to be granulated, but on closer inspection the granules are found to arise from the disintegrated outer peridium.—*Berk.*, in Cooke's Handbook of Brit. Fung.

Hab.: Gladfield, on scales of onions and bracts of maize, *C. J. Gwyther.*

GEASTER, Mich.

G. Archeri, *Berk.*, Fl. Tasm. ii. 264, t. 88, f. 9; *Sacc.*, Syll. 1590, Cooke's Austr. Fungi 231. Outer peridium cut to the middle into 6 to 7 lobes; laciniæ flaccid, acuminate, revolute; inner peridium globose, purplish umber; peristome elongated, conical, sulcate-plicate, indistinctly marginate; capillitium umber; spores globose, rufous-olive, even, 5 μ diam.—*Cke., l.c.*

Hab.: Gladfield, *C. J. Gwyther.*

First met with in Tasmania.

LYCOPERDON, Tourn.

L. Gunnii, *Berk.*, Fl. Tasm. ii., 265; *Sacc.*, Syll. vii. 341; *Cke.* Austr. Fungi. 239. Sessile, sub-globose (1 to 2 in. diam.), with very minute stellate warts. Columella short; spores bright olive, globose with long pedicels ($\frac{1}{6000}$ in.).—*Cooke l.c.*

Hab.: Near Warwick, *C. J. Gwyther.*

Also in the pastures of Tasmania and Victoria.

SPHACELOTHECA, De Bary.

(From *sphacelos*, rottenness; and *theca*, capsule.)

Part of the mycelium converted into a central fleshy columella, surrounded by the mass of spores; spores solitary, sporidiola acrogenous, on a septulate promycelium.—Cooke's Austr. Fung.

S. hydropiperis, *Schum.*; Sacc. Syll. Fung. vii. 499, and Cooke's Austr. Fung. 327; *Ustilago Hydropiperis*, Schret.; *Uredo Hydropiperis*, Schum.; *U. Bistortarum var. ustilaginea*, Dl.; *Cæoma Bistortarum*, Link.; *Ustilago Candollei*, Tul. Horn-shaped, evolved in the more or less swollen ovaries, replete with dark violet powder, opening at the apex and emitting the spores; spores solitary, globose, or ellipsoid or rounded, angular, 9-20 x 8-12 μ, or 8-17 μ; epispore even, dark violet, delicately granulose.—*Cooke, l.c.*

Hab.: Gladfield, in the ovaries of a *Polygonum*, *C. J. Gwyther.*

The same fungus infests the ovaries of many species of *Polygonums* in Europe and America.

PUCCINIA, Pers.

P. carissæ, *Cke. and Mass.* (n. sp.).

Hab.: Gladfield, on leaves of *Carissa ovata*, *C. J. Gwyther.*

The author's description not yet to hand.

UREDO, Pers.

U. pallidula, *Cke. and Mass.* (n. sp.).

Hab.: Gladfield, on the pods and leaves of a Cassia, *C. J. Gwyther.*

The author's description of this new species not yet to hand.

ASCOBOLUS, Pers.

A. Phillipsii, *Berk.*, Cooke's Austr. Fung. 268. Cups concave, with an elevated margin (3-5 mm.), externally wax-colour, then tawny, smooth; disc cinereous; asci clavate; sporidia elliptical, smooth, without striæ or reticulations, becoming brown (21-28 x 11-13 μ); paraphyses clavate.

Hab.: Gladfield, on dung, *C. J. Gwyther.*

CALONECTRIA, De Not.

(Literally, beautiful Nectria.)

Perithecia free or cæspitose, superficially-erumpent, somewhat soft, bright-coloured, globose, papillate afterwards bissoid or pilose; sporidia oblong or fusoid, 2 or more septate, hyaline.

C. otagensis, *(Lind.), Sacc.*; *Nectria otagensis*, Lind.; Sacc. Syll. Fung. ii. Add. 68. Perithecia densely cæspitose, pale-yellow; sporidia distichous, fusoid, obtuse at both ends, 1 to 3 septate hyaline.

Hab.: Gladfield, on twigs of the native Pomegranate, *Capparis Mitchelli, C. J. Gwyther,*

This fungus was first met with at Otago, New Zealand, on decayed branches of *Sophora tetraptera.*

XYLARIA, Schr.

X. scopiformis, (*Kunze*) *Mont.* Cke.; Austr. Fungi 285; *Sacc.*, Syll. i. 340. (*Hypoxylon scopiforme*, Kunze.) Simple, slender, often fasciculate, 2 to 3 cm. long, clubs (1 to 1½ cm. long, 1 mm. thick) cylindrical, acute at the apex, black; stem about as long as the club, smooth, often compressed; perithecia few, large, inflated the clubs so as to appear nodulose. Sporidia unequal sided, dark brown (10 to 12 x 3½μ.)—*Cke. l.c.*

Hab.: On decaying fruit of *Flindersia australis* (Crow's Ash), Bunya Mountains, *H. Tryon.*

A tall variety is met with at Ceylon. The species has been also collected in Guiana, Surinam, Brazil, and Cuba.

X. rhizophila, *Cke. and Mass.* (n. sp.).

Hab.: Gladfield, on roots of herbaceous plants, *C. J. Gwyther.*

The description of this new *Xylaria* is not yet to hand.

USTULINA, Tul.

Stroma superficial, somewhat effused, rather thick, determinate; hymenium bearing conidia, pulverulent, whitish, becoming cinereous, then rigid, carbonaceous, black, naked, often becoming hollow; perithecia immersed, large horny; asci pedicellate; sporidia ovoid-fusiform, continuous, sooty-brown.—*Cke.* Austr. Fungi 290.

U. vulgaris, *Tul. Cke.;* Austr. Fungi 290, Sacc.; Syll. 1328. Stroma superficial, rather effused, repand, pulvinate, large, thick, undulated, at length quite black, carbonaceous, fragile, hollow within; perithecia

large, ovate, densely crowded, peripherical, with a prominent ostiolum; asci cylindrical, 250 x 8 to 10 μ; sporidia fusiform, unequal sided, curved, turning black, 32 to 40 x 8 to 13 μ.—*Cke. l.c.*

Hab.: On logs, Eumundi, *Field Naturalist.*

Also found on the stems of *Fagus* (Beech), *Tilia* (Lime-tree), and *Carpinus* (Hornbeam), in Europe, Cuba, Guyana, &c., North America and Ceylon.

HYPOXYLON, Bull.

H. atrosphæricum, *Cke. and Mass.* (n. sp.) Description not to hand.

Hab.: On logs, Eumundi, *Field Naturalists.*

ROSELLINIA, Not.

R. seriata, *Cke. and Mass.* (n. sp.) Description not to hand.

Hab.: On rotten wood, Gladfield, *C. J. Gwyther.*

UROMYCES, Link.

U. puccinioides, *Berk. and Muell.*, Linn. Journ. xiii. 173; Sacc. Syll. 2100. Æcidia aggregate, on brown orbicular spots, opposite; pseudoperidia scattered, not circinate, margin short; æcidiospores orange (*Æcidium goodeniacearum*, Berk.); sori bullate; teleutospores brown, apiculate, sometimes with the apex, oblique or dentate, pedicellate.—Cooke's Handbook of Austr. Fung. 332.

Hab.: On *Scævola* and *Goodenia* at St. George, *Jos. Wedd.*

HAMASPORA, Korn.

Teleutospores multiseptate, sometimes uniseptate, free; pedicels coalesced in a prominent cylindrical gelatinous body.—*Cooke's* Austr. Fungi, 340.

H. longissima, (*Korn. Phragmidium longissimum*, Thum.) *Sacc.* Syll. vii. 2630; *Cke.* Austr. Fungi, 340. Uredosporiferous sori on the lower surface, scattered, or gregarious, or confluent, clear-orange; uredospores globose, or ovoid, even, reticulate (16μ. diam), pale yellow, epispore thick; teleutospore sori gregarious, pale ochre, tendril-like; teleutospores very long, linear-lanceolate, 4 septate (or more), yellowish, apex acute, hyaline, 200 to 240 x 13 to 14μ, pedicels very long, hyaline.—*Cke. l.c.*

Hab.: On Rubus leaves at Eudlo. Description wanting in Botany Bulletin, No. V.

First found on the living leaves of *Rubus rigidus* at the Cape of Good Hope.

ÆCIDIUM, Pers.

Æ. Goodeniacearum, *Berk.*, Linn. Journ. xiii. 173. (See *Uromyces puccinioides*, B.) Spots orbicular, brown beneath, or obsolete; pseudoperidia scattered (or circinate), with an abbreviated margin; spores orange.—Cooke's Handbook of Austr. Fung. 342.

Hab.: On *Scævola* and *Goodenia* at St. George, *Jos. Wedd.*

Æ. compositarum, *Mart.* Cooke's Austr. Fungi 340; Sacc. Syll. vii. 2815. Spots purplish, subrotund, and confluent; pseudoperidia crowded on the spots, in orbicular patches, or circinating;

margin white, revolute, laciniate; æcidiospores oval or subglobose, 15 to 20 μ diam. (Numerous varieties which have received names from the plants they infest.)—*Cooke l.c.*

Hab.: Gladfield, on compositæ, *C. J. Gwyther.*

Æ. deeringiæ, *Cke. and Mass.* (n. sp.) (Description not to hand.)

Hab.: On leaves of Deeringia celosioides, Gladfield, *C. J. Gwyther.*

ASTERINA, Lev.

A. hoveafolia, *Cke. and Mass.* (n. sp.).

Hab.: On leaves of *Hovea longifolia* at Gladfield, *C. J. Gwyther.*

The author's description of this new species is not yet to hand.

PHYLLOSTICTA, Pers.

P. fragaricola, *Desm.* Cooke Austr. Fungi. 346; Sacc. Syll. iii. 40 No. 219. The strawberry-leaf blight. Spots straggling, becoming bleached, with a red margin; perithecia punctiform, remotely scattered; sporules oblong-ovoid, 5 x 1½ to 2 μ, straight, without nuclei, hyaline.—*Cooke l.c.*

Hab.: On strawberry leaves, Brisbane. Found also on strawberry plants in many parts of Europe.

PHOMA, Fries.

P. folliculorum (*Lév.*) Sacc., *Sphæropsis folliculorum,* Lév. Erumpent; perithecia gregarious, immersed, glabrous, black, conical, depressed, and papillate about the ostiolum, surrounded by whitish spots; sporules ovoid, continuous, hyaline.

Hab.: Near Townsville, on follicles of a *Marsdenia, E. J. Banfield;* on the same follicles Dr. Cooke found a new species of *Diplodia, D. Marsdenia.*

When first met with it was parasitic on follicles of *Asclepias curassavica* in the herbarium of Joseph Decaisne, for a long time Director of the Paris Jardin des Plantes.

DIPLODIA, Fries.

D. Marsdeniæ, *Cke. and Mass.* Grev. xxi. 75. Gregarious, perithecia, obturbinate, black, erumpent above, with a short ostiolum; sporides elliptical, for a long time continuous, and hyaline, with a granular plasma, at length uniseptate, not constricted, dark brown, 22 x 10 μ, on basidia of the same length.—*C. and M. l.c.*

Hab.: In company with *Phoma folliculorum,* Lev., on follicles of a *Marsdenia,* near Townsville, *E. J. Banfield.*

VERMICULARIA, Fries.

(So named from the supposed resemblance of the spores to little worms.)

Perithecium thin, mouthless, generally bristly; spores vermiculate.—*Berk.*, Outl.

Hab.: Gladfield, on some leaflets of *Flindersia.*

Dr. Cooke observed what appeared a species of the above genus, but finding no spores nothing further could be determined.

DARLUCA, Cast.
(After M. Darluc.)

Perithecia delicate; spores containing a row of sporidiola, oozing out and forming a tendril.—*Berk.*, Outl.; Cooke's Handb. of Brit. Fung.

D. filum, *Cast.* "Parasitic Darluca." *Sphæria Filum*, Biv.; *Darluca vagans*, Cast.; *Diplodia uredinicola*, Desm. Gregarious, very minute; perithecia globose, black, shining, pierced; spores hyaline, oblong, straight, containing four minute sporidioles.—*Cooke, l.c.*

Hab.: Gladfield, on leaves of Sorghum and Muchlenbeckia infested with *Uredo sorghi* and *U. rumicis, C. J. Gwyther.*

MELASMIA, Lev.

M. tecomatis, *Cke. and Mass.* (n. sp.).

Hab.: On leaves of *Tecoma jasminoides*, at Gladfield, *C. J. Gwyther.*

Author's description of this new species not yet to hand.

GLŒOSPORIUM, Mont.

G. Alphitoniæ, *Cke. and Mass.* (n. sp.).

Hab.: Gladfield, on leaves of *Alphitonia excelsa, C. J. Gwyther.*

Author's description of this new species not yet to hand.

PENICILLIUM, Link.

Sterile hyphæ creeping, septate; fertile threads at the apex unequally verticillately branched or penicillate; conidia sphæroid, produced in chains, hyaline, or brightly coloured.—*Cooke*, Austr. Fungi, 369.

P. glaucum, *Link*, Cooke, Austr. Fungi 369; Sacc. Syll. iv. 78. *Aspergillus simplex*, Pers., *Botrytis glauca*, Spreng., *Mucor crustaceus*, Linn. (?), *Penicillium crustaceum*, Fries, *P. expansum*, Link. Mycelium effused, creeping, white, sterile hyphæ creeping, intricate, septate; fertile hyphæ erect, branched in a penicillate manner at the apex, branches solitary or in pairs, erect, once or twice forked at the apex; branchlets erect; conidia seated at the apices in chains, sphærical or broadly elliptic, smooth, verdigris-green, hyaline, 4 μ diam.—*Cooke l.c.*

Hab.: Found on fruit, leaves, stems, &c., almost everywhere. The mycelioid condition of this species constitutes what is known as "the vinegar plant." A short time ago it was observed in brine used for meat-pickle at a Brisbane establishment.

MICROCOCCUS, Hall.

Cocci globose or ovoid, entire, single or crowded, or accumulated in colonies, or zooglœa, a colony embedded in a gelatinous substance. These gelatinous masses are also known by the name of Palmella. Sacc. Syll. viii. 1076.

M. crepusculum, *Ehrenb.*, Sacc. Syll. viii. 1082, No. 4284. Invested by a thick tegmen, viscid mucous, liquescent, of a whitish or becoming a pale-brown colour; cocci globose, 2 μ diam., single or congregated in colonies. Sacc. Syll. l. c.

Hab.: Taken from a bottle of Brisbane hop beer. This species is frequently found in putrescent liquids.

By Authority: Edmund Gregory, Government Printer, William street, Brisbane.

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BOTANY BULLETIN No. IX.

SEPTEMBER, 1894.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

BY AUTHORITY: EDMUND GREGORY, GOVERNMENT PRINTER, WILLIAM STREET.

1894.

NOTICES.

THE present Bulletin brings the record of the Queensland Flora to September, 1894, and the author takes the opportunity of thanking the many persons who continue the work of collecting and forwarding their specimens to him for determination. By this means the range of species becomes known, and fresh species are brought to our knowledge.

The aboriginal and local names attached to some of the specimens forwarded have proved of great interest, and it is to be hoped that correspondents will continue to attach such names to their specimens, and also notes of any economic properties which the plants are supposed to possess.

Specimens of the indigenous plants of all parts of the colony are acceptable, and, if numbered, their names and any other information required will be returned to the senders.

Botanic specimens of the timber trees of the Johnstone and Daintree Rivers, and also of the Herberton district, are particularly desired for the purpose of adjusting the nomenclature; this has become necessary from the same local name in very many instances having been given to so many quite distinct trees as to have rendered local names useless, or at least confusing. Persons engaged in the timber trade should see that it would be to their advantage to assist in this matter, and the author hopes, therefore, to receive their assistance in his endeavour to adjust the timber nomenclature. It will be observed that in recording fresh Fungi advantage is taken to give descriptions of other species which may be wanting in earlier publications.

30th September, 1894. F. M. B.

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BOTANY:

CONTRIBUTIONS TO QUEENSLAND FLORA.

Order MAGNOLIACEÆ.

Tribe WINTEREÆ.

GALBULIMIMA (n.g.)

(Named from the resemblance of the fruit to a galbulus.)

Sepals 2, deciduous, at first entire but at length opening on one side down to the base, 2-seriate. Petals none, except the single outer series of staminodia be regarded as such. Stamens numerous in many series, on a raised torus; filaments much flattened, linear, bearing on the back, nearer the base than the apex; 2 adnate oblong anthers. Ovary glandular hirsute with about 7 or 8 prominent angles; stigmas purplish, more or less recurved and papillose. Berry globose, 8 or more celled, 5 usually with matured seed. Seeds with a loose outer ragged coat; testa smooth, cartilaginous; albumen copious, oily. Embryo not particularly small near the hilum, apical with reference to the position of the seed in the berry. An evergreen tree of about 50 ft., foliage and fruit possessing a strong resinous odour. The nearest ally of this new genus seems to be *Illicium*.

G. baccata (n. sp.). An evergreen tree of about 50 ft. in height, having a stem diameter of about 1½ ft.; the young branchlets with a bronzed appearance from numerous bright ferruginous scales. Leaves alternate, margins entire, oblong-lanceolate, attaining the length of 4½ in. on petioles of about ¾-in.; the upper face dark green. glossy; under side covered with minute scurfy glands or scales, pellucidly-dotted. Flowers axillary, solitary, on peduncles of about ½-in., bearing near the top 2 or 3 thick angular bracts; pedicel short; bud ovoid; sepals 2, one entirely overcovering the other; petals wanting; stamens numerous, the outer series without anthers; filaments much flattened, linear, bearing in the lower half; 2 parallel, oblong, sessile anthers. Ovary angular, sessile, clothed with ferruginous bright hairs. Fruit globose, crimson, resembling a fleshy *Callitris* fruit in its form and markings. Seeds compressed, embedded in the substance of the fruit.

Hab.: Eumundi, *E. H. Arundell.*

Order STERCULIACEÆ.

TARRIETIA, Blume.

T. argyrodendron, var. macrophylla (n. var.) This variety forms a large tree, and differs considerably from all others in its timber, which is strong, hard, and durable. The wood is close in grain, and the dark-coloured zones add to its beauty and make it worthy of the attention of the cabinetmaker. On the flowering

branchlets sent with the sample of timber the leaflets are three, silvery on the under side, and much larger than those of the normal form. The flower panicles are large; but the flowers on those examined were only in the early bud state.

Hab.: Barron River, *E. Cowley.*

Order TILIACEÆ.

Tribe SLOANEÆ.

ELÆOCARPUS, Linn.

E. eumundi, *Bail.*, Proc. Roy. Soc. of Ql., April, 1894. A tree of considerable size and erect growth. Leaves more coriaceous than most other Australian species, mostly oblong-lanceolate, 3 to 5 in. long, and 1 to 1½ in. broad near the middle; on somewhat slender petioles of 1½ to 2 in. in length; the margins entire or with distant rather prominent blunt teeth in the upper part; apex often elongated, but blunt. The young growth, petioles, and midrib more or less clothed with appressed, short, grey hairs, which are also sometimes found sparsely scattered over the lamina on the under surface. Inflorescence lateral on the two-year-old wood. Racemes seldom exceeding 2 in. in length, pedicels about ½-in. Flowers not seen. Drupe (not quite ripe) oval, ¾-in. long; pericarp juicy, sharply acid; putamen deeply pitted, containing 1 or 2 seed. The fruit structure reminds of the Indian species, *E. oblonga.*

Hab.: Eumundi, *Field Naturalists*, March, 1894.

Order BURSERACEÆ.

BURSERA, Linn.

B. australasica, *Bail.* The diagnosis of this tree given in Botany Bulletin V. was drawn up from a few fragmentary shoots picked up in the Eumundi scrubs, but the trees were not identified until met with by the Field Naturalists when botanising in the same locality during the last Easter holidays. I am now, therefore, enabled to correct and add to the former description, as follows:—Tree of considerable size, the bark shedding somewhat similar to the red cedar in hard woody scales. Leaflets 3 to 7, from 1½ to 4 in. long; common petiole from 1½ to 2½ in. long, and the petiolule varying from 3 to 9 lines long. Drupe, when ripe, with a very juicy epicarp. I have received foliage specimens from near the same locality of a tree said to be known there as Red Carrot-wood and White Carrot-wood, which I believe identical with the above *Bursera.* These local names, however, in some instances, are only known to a few persons, and therefore are of little use for identification.—Proc. Roy. Soc. of Ql., April, 1894.

Order OLACINEÆ.

Tribe PHYTOCRENEÆ.

CARDIOPTERIS, Wall.

(This genus is given in Hooker's Flora of British India in the above order, but as a genus of doubtful affinity.)

Calyx 4 or 5-parted; lobes imbricate, persistent, but not or only slightly accrescent. Corolla deciduous, between rotate and funnel-shaped, 4 or 5-lobed; stamens 4 or 5, inserted on the base of the tube

of the corolla, alternate with its lobes; filaments short, glabrous; anthers 2-celled, introrse, dehiscing longitudinally; pollen-grains 4-angular. Ovary free, surrounded at the base by a thick fleshy annular disk, oblong, compressed, 1-celled; ovules 1 (rarely 2), pendulous, naked, micropyle ultimately superior. Style 2-branched, one branch deciduous, curved, capitate at the apex; the other accrescent, ultimately deciduous, divided at the apex into 2 unequal, ovate, rather obtuse divisions. Fruit ovate-orbicular, emarginate or obcordate, compressed, very broadly winged, 1-celled, indehiscent. Seed solitary, linear, furrowed; embryo minute, in hard fleshy albumen. A climbing herb with milky juice. Leaves alternate, long-petioled, simple or lobed, cordate, palminerved. Flowers ebracteate, in axillary racemose or paniculate cymes, bisexual, dichlamydeous.—*Masters* in Hook. Fl. Brit. Ind.

C. lobata, *R. Br.* Stem terete, striate. Leaves 3 to 5 in. by 3 to $4\frac{1}{2}$ in., glabrous, membranous, polymorphous, usually more or less angular and slighty lobed; base 7 to 9-nerved, cordate; lobes acute or acuminate, widely divergent; petiole 3 to 5 in. Peduncles $2\frac{1}{2}$ to 4 in., solitary, axillary, dichotomous; pedicels puberulous, erect, ultimately spreading or recurved. Flowers rather crowded, secund, ebracteate. Calyx puberulous. Corolla slightly exceeding the calyx, whitish, deciduous. Fruit 1 to $1\frac{1}{2}$ in. by $1\frac{1}{4}$ in. The plant varies much in the consistence and form of the leaves, occasionally even on the same specimen; hence, by some writers, several species have been proposed.—*Hook. l.c.* The Australian form is that known as var. *moluccana*. The plant has some resemblance to a yam, *Dioscorea;* and by some has been mistaken for a species of that genus.

Hab.: Barron River, *E. Cowley*, 1892.

Order SAPINDACEÆ.

RATONIA, DC.

R. Lessertiana, *Benth. and Hook. f.*, Gen. Pl. i. 400. A large shrub or small tree. The branchlets, leaf-petioles, rhachis, and inflorescence puberulent, but the dark-reddish colour of the bark plainly visible. Leaflets 4 or 5 (on the specimens examined), opposite or alternate, usually lanceolate, 4 to 7 in. long, and from $1\frac{1}{4}$ to 2 in. broad in the widest part; the apex obtuse, but often elongated; base cuneate to the short slender petiole; texture thin; primary veins distant, and the reticulation delicate. Inflorescence a racemose panicle, slender and drooping, 4 to 8 in. long; the branches very short, or one $1\frac{1}{2}$ or 2 in. long; flowers minute, only seen at base of fruit. Capsule red, $\frac{3}{4}$-in. long, globose-pyriform, glabrous, stipitate, triquetrous towards the base. All examined 1-seeded.

Hab.: Daintree River, *E. Cowley*.

The above species, with which I believe our Australian to agree, and under which I place it, enjoys a wide range, being, according to Sir J. D. Hooker, met with in Tenasserim, South Andaman Islands, Malacca.

Order ONAGRARIEÆ.

ŒNOTHERA, Linn.

Œ. longiflora, *Jacq.* The long-flowered Evening Primrose. Plant with erect stem, pilose. Leaves oblong to lanceolate, denticulate. Flowers large, bud erect; free part of the calyx-tube 3 to 4 times as

long as the ovary, filiform; petals yellow, nocturnal, bilobed. Stigma 4-parted; divisions elongated. Stamens included. Capsule linear. Seeds minute, scrobiculate.

Hab.: A plant belonging to Buenos Ayres, which has become naturalised at the Warrego River, from whence my first specimens were received in 1887 from Mr. A. P. Jones. It is also found about Toowoomba.

Order MYRTACEÆ.

EUGENIA, Linn.

E. hemilampra, *F. v. M.*, Fragm. ix. 145 (name proposed). In Moore and Betche's Handb. of the Fl. of N.S.W., 207, it is also referred to as a probable form of *E. Smithii*, but no description seems ever to have been published of the flowers or fruit. A tree of large size, having a stem diameter of from 1½ in. to 3 ft.; the branchlets frequently flattened and dark-coloured. Leaves lanceolate or elliptical, obtusely acuminate or almost pungent, 3 in. to 5 in. long; veins fine, numerous, parallel, very oblique, joining in an intramarginal one near the edge; under side more or less light-coloured; upper side dark-green. Oil-dots only visible before a strong light; much more obscure and very minute in the southern plant, larger but still somewhat obscure in the northern specimens. Flowers very small and numerous, in a terminal trichotomous panicle, which is more developed in the northern than in the southern examples. Calyx-border prominent; teeth very minute and obscure in the flower. Petals mostly cohering and falling off together, tomentose; the whole calyptra about ⅓ line diameter. Stamens twice as long as the petals; filaments flexuose. Anthers with globular divaricate cells, as in *E. Smithii*. Fruit crimson, globular, 1¼ in. diameter, crowned by the small circular scar of the calyx-rim and the minute calyx-teeth, and often with a few stamens. Cotyledons as in *E. Smithii*.

Hab: Johnstone River (flowering specimens), *Dr. Thos. L. Bancroft*; Eumundi (fruiting specimens), *W. Munro Hull*.

Fruit useful for preserving, being fleshy and of a sharp acid flavour.

Order LYTHRARIEÆ.

PUNICA, Linn.

Calyx-tube funnel-shaped, coriaceous, adnate to the ovary below, enlarged above the ovary; lobes 5 to 7, persistent on the fruit. Petals 5 to 7, lanceolete, wrinkled, inserted between the calyx-lobes. Stamens numerous, inserted round the mouth of the calyx. Ovary inferior with many cells in two whorls; style long, bent, stigma capitate; ovules numerous, placentas in some cells axile, in others parietal. Berry inferior, globose, many-celled. Seeds very many, angular, testa coriaceous with a watery outer coat; cotyledons convolute. Large shrubs; branches often armed. Leaves opposite, subopposited, or clustered, oblong, obovate, obtuse, entire. Flowers shortly pedicellate, axillary, solitary or clustered, large, orange-red or creamy-white.

P. Granatum, *Linn.* Pomegranate. A dense shrub or small tree, often spinous, deciduous. Leaves about 2 in. long and ⅓-in. broad, narrowed towards both ends, with the intramarginal nerve

distinct or obscure. Calyx-lobes about 1 in. long, the petals longer. Fruit globose, often large, the numerous seeds covered with a very juicy pulp, which is sharply acid or sweet.

Hab.: This common plant of India and Persia has strayed from cultivation and become naturalised about Bundaberg.—*J. Keys.*

NOTE.—Dr. W. Dymock, Veg. Mat Med. of W. India, says that the Arabs recommend the root-bark as being the most astringent part of the plant, and a perfect specific in cases of tapeworm; it is given in decoction, prepared with two ounces of fresh bark, boiled in a pint and a-half of water till but three-quarters of a pint remain; of this when cold a wineglassful may be drunk every half-hour till the whole is taken. This dose sometimes sickens the stomach a little, but seldom fails to destroy the worm, which is soon after passed.

The seeds of the pomegranate are considered to be stomachic, the pulp cardiacal and stomachic. The root, bark, and rind of the fruit are officinal in the Pharmacopœia of India.

Order SAPOTACEÆ.

SIDEROXYLUM, Linn.

S. eerwah, *Bail.* Proc. Roy. Soc. of Ql., April, 1894. A medium or large-sized tree. I have only leaves, young fruit (probably not more than two or three weeks old), and fully ripe fruit, scarcely enough to establish a species, only that, these being so very distinct from all the other Australian species, it is better for it to bear a distinctive name, and the description can be filled up at some future time. The leaves closely approach those of *S. oborata*, being obovate or broadly elliptical, obtuse, decurrent upon the petiole, including the latter, about 5 in. long, with a breadth of 2½ in. at the broadest part. Pedicels glabrous, 3 or 4 lines long. Calyx-segments obtuse, nearly orbicular, glabrous except for the ragged membranous ciliate margins, about 1 line in diameter. Ovary with a dense ring of glossy brown hairs at the base, the rest part glabrous. Ripe fruit of a reddish purple, oval, but often tapering towards the base so as to become somewhat pear-shaped, 2 to 2½ in. long, containing 1 or 2 seeds, the 2-seeded fruits much compressed. Seeds when 2 in a fruit shaped like a cowrie shell, from ¾ to 1¼ in. long; hilum broad, the length of the seed.

Hab.: Near Mount Eerwah, *Field Naturalists*, 24th March, 1894.

Order APOCYNACEÆ.

CARISSA, Linn.

C. ovata, *R.Br.*, **var. stolonifera,** *Bail.* Referred to in Dr. Thos. L. Bancroft's paper in Proc. Roy. Soc., June, 1894. This form is of a dwarf spreading habit, the branches, bending down, take root when they touch the soil and form fresh plants, thus one plant will soon cover with a low bushy growth a large space. The stems are more slender and the leaves smaller than in the coastal or normal form. Another and more remarkable distinction is that while the normal form Dr. Thos. L. Bancroft found to contain little or no poisonous properties, the bark of this inland plant he found to possess an exceedingly bitter poisonous principle.

Hab.: Near Dalby, *Dr. Thos. L. Bancroft.*

Order ASCLEPIADEÆ.

Tribe CYNANCHEÆ.

ARAUJIA, Brot.

(Named after Antonio de Araujo, a great promoter of botany in Portugal.)

Calyx 5-parted, eglandulous inside, segments foliaceous; corolla hypocrateriform or almost infundibuliform, with 5 swellings outside at the base and a corresponding number of cavities inside; limb slightly spreading and 5-lobed. Corona adnate to the base of the corolla; anthers terminated by a membrane; pollen-masses pendulous, fixed by their tapering tops. Stigma ovate, 2-horned at the apex. Follicles ovate, ventricose, bent downwards, semi-bilocular, thick, coriaceous, smooth or at length tuberculose-muricate. Seeds comose, adhering to the lamellæ of the dissepiment. Twining plants, hoary or hirsute. Leaves opposite. Cymes few-flowered. Flowers whitish or rose-coloured.

A. albens, *G. Don.* (*Physianthus albens,* Mart.) A twiner, with ovate or lanceolate leaves 2 or 3 in. long, truncate or cordate at the base, and acute at the apex, white underneath as well as the young shoots. Flowers in subdichotomously branched cymes; pedicels about 7 lines long, calyx-segments broad, leafy. Corolla with a broad tube and a 5-lobed limb. Corona of 5 fleshy segments attached to the corolla-tube at the base, the upper portion hood-shaped or convex with revolute margins. Pollen-masses pendulous. Follicle glaucous, thick, oval, 2½ to 3 in. long, and 2 in. in diameter.

Hab.: A native of South Brazil, naturalised about the Brisbane River and Darling Downs.

Order VERBENACEÆ.

Tribe VERBENEÆ.

STACHYTARPHETA, Vahl.

S. mutabilis, *Vahl.* A rather dense shrub of 4 or 5 ft., scabrous-pubescent. Leaves ovate, serrate, contracted into the petiole, scabrous above, pubescent beneath; spikes elongated, 12 to 18 in. long, erect, furrows at length narrower than the thickened rhachis; bracts lanceolate-subulate, spreading above the middle; calyx 5 to 6 lines long, 4-toothed, hispid; corolla large red or rosy-red, the limb 6 to 8 lines in diameter at times.

Hab.: This South American shrub has become naturalised near Port Douglas, *E. Cowley.* The plant is also naturalised in the Seychelles.

Tribe CHLOANTHEÆ.

NEWCASTLIA, F. v. M.

Calyx campanulate, 5-lobed, valvate in the bud. Corolla-tube campanulate, the limb of 5 nearly equal lobes. Stamens 5; anthers without appendages. Ovary small, completely 2-celled, with 2 ovules in each cell laterally above the middle. Style slender, entire, or minutely 2-lobed. Fruit not exceeding the calyx, not succulent, apparently separating into 4 nuts. Densely woolly or cottony shrubs. Leaves opposite, undivided. Flowers opposite and sessile, in dense terminal woolly spikes, or forming an elongated panicle with spike-like

branches. Bracts often prominent upon the growing points of inflorescence, but with the bracteoles usually very deciduous.—Flora Austr. v. 39.

N. cladotricha, *F. v M.* in Hook Kew Journ. ix. 22; Fragm. i. 184, t. i. and iii. 21; Flora Austr. v. 40. The name referring to the branched hairs of the indumentum. An erect shrub, attaining 2 to 3 ft., densely clothed with white or rust-coloured woolly branching hairs, and strongly scented. Leaves sessile, narrow-oblong to ovate-lanceolate, obtuse, rounded at the base, the margins slightly recurved, ¾ to over 1 in. long, thick, very rugose, reticulate underneath, loosely hirsute or tomentose on both sides with branched hairs. Inflorescence in elongated panicles with spike-like branches, or in spikes at first short and dense, but lengthning sometimes to several inches and interrupted. Bracts ovate or ovate-lanceolate, densely covered with a dark-brown tomentum, imbricate in the very young spike and at the growing end, but falling off early. Calyx about 1½ lines long, very woolly, the lobes rather shorter than the tube. Corolla glabrous outside, the tube broad, about as long as the calyx, lobes short and broad, with blue points. Stamens about as long as the tube, inserted above a woolly ring near the base, alternating with the corolla-lobes; filaments very short, anthers ovate dorsally attached. Pollen bright-yellow. Style scarcely exserted, stigma minutely emarginate. Ovary glabrous. Ovules attached near the top, but the seed enlarges upwards so as to be attached near the base.

Hab.: St. George, *J. Wedd.*

Order LAURINEÆ.

Tribe PERSEACEÆ.

CRYPTOCARYA, R. Br.

C. oblata (n. sp.) This is said to be a tree of considerable size. The young growth and inflorescence covered with a more or less dense clothing of short bright ferruginous hairs, but soon becoming perfectly glabrous; branchlets very angular, nearly black, with numerous light-coloured lenticelles; leaves broadly lanceolate with elongated points, attaining 5 or more inches in length, the primary veins few, distant, and not very prominent, and the reticulation somewhat faint; texture membranous; petioles short; fruit oblate and laterally compressed, the broadest diameter about 1¾ in., marked by prominent ribs, the fleshy covering softer and more juicy than usual in the genus. The perianth is more persistent in this fresh species than in any other Australian plants of the genus; but I could find none perfect enough to describe any of its parts, except, I might observe, that the staminodia seemed large and to resemble those of *C. Wightiana*, Thwaites.

Hab.: Daintree River, *E. Cowley.*

Order LILIACEÆ.

CORDYLINE, Comm.

C. terminalis, var. Baileyi. This is a very beautiful variegated form, which was found a few years ago by Mr. W. T. Bailey, on Holham Creek, Pimpama. The plant has since been propagated from cuttings, and all the plants thus obtained have retained the variegated

Order ORCHIDEÆ.

DENDROBIUM, Swartz.

D. linguiforme, var. Nugentii (n. var.) This species differs considerably in the form and size of its tongue-like, thick leaves, but until I received Mr. Nugent's specimens I have never observed any marked variation in the flowers. These, however, at first sight strike one as being distinct, and differ from the more commonly known plant in the following particulars:—Smaller flowers, shorter pedicels, segments scarcely exceeding 4 lines in length; white, except for a tinge of yellow near the pouch; the labellum not half the length of the other segments, the lateral lobes being of a lilac colour; in other respects this Northern plant agrees with the normal form.

Hab.: Eungella Range, *L. J. Nugent.*

Order GRAMINEÆ.

PASPALUM, Linn.

P. Galmarra (sp. nov.) In my report upon the Botany of the Bellenden-Ker Expedition, 1889, I referred to this grass, which I had gathered along Harvey's Creek, a tributary of the Russell River. thinking it probably the one Dr. Robt. Brown had given in his "Prodromus Floræ Novæ Hollandiæ" as *Paspalum pubescens.* It proves, however, not to be Brown's grass, but a new species. The name *pubescens* might stand under my authority, but there having been several grasses to which the name *Paspalum pubescens* has been given, I consider it better that the present species should be known under another distinctive specific name, and therefore give to it the aboriginal name of "Jacky Jacky"—Galmarra, explorer Kennedy's faithful attendant—and recommend for a common name that of "Russell River Grass." Lately I have heard from Mr. P. R. Gordon that this grass is considered excellent for stock by settlers at the Russell River. I am indebted to Mr. A Meston for the name "Galmarra."

It may have been observed that, in making use of the aboriginal name of a person or place for the specific name of a new plant, I have simply used the word without in any way latinising it. Some botanists may not approve of this, but we must remember how few are the instances where native names or words are preserved, and also how frequently the latinising of such would destroy the euphony.

Order FUNGI.

AGARICUS, Linn.

A. (Collybia) muscipula, *Cke. and Mass.*, Grev. xxii. 36. Pileus fleshy, umbonate, smooth, mouse-grey or brown, wrinkled. 3-4 in. broad; substance thin, tough; margin shortly incurved; stem elongated, stuffed, 8-9 in. long, ½-in. thick, tapering downwards and rooting, longitudinally striate, often twisted; gills broadly adnate. very broad, scarcely crowded; spores whitish, subglobose, 14 × diameter, with a minute apiculus. Much resembling *A. radicatus.* but with very different spores. *A.* (*Collybia*) *radicatus*, var. *superbiens.* Berk., has large elliptical spores.—*Cooke l.c.*

Hab.: Near Brisbane, *Dr. J. Bancroft.*

The description of this new species was not to hand when Botany Bulletin VII. was published.

BATTARREA, Pers.

(Named in honour of Antonia Battarra, who published a work upon Fungi in 1759.)

Peridium composed of two membranes, volviform, dehiscing in lobes, distinct from the ascending receptacle, which is stipitate, pileate, pulverulent above, membrane of the interior peridium when broken calyptrate, subterranean peridium rooting.—Cooke's Austr. Fungi, 225.

B. phalloides, *Dicks.*, Pers. Syn. 139, t. 31 f. 1; Sacc. Syll. vii. 195: Cke. Austr. Fungi, 225. (So named from its resemblance to the genus *Phallus.*) Volva ovate, bicorticate, whitish, repleto with mucus; stem cylindrical, a little attenuated towards each end, straight, fleshy, replete with mucilage, at first short, afterwards quickly elongated upwards; peridium campanulate, smooth and even below, above covered with a thick, powdery, brown stratum which is a portion of the ruptured volva, like a calyptra. Spores brown (6 μ, minutely warted).—*Cooke l.c.*

Hab.: Gladfield, *C. J. Gwyther.* Other Australian habitat: Murchison River, Lake Albacutya. The foreign habitats are England and various other European countries, and North America.

MORCHELLA, Dill.

(From the German *morchel.*)

Fungi between waxy and fleshy, clavately pileate, confluent with the central hollow stem; plicately or reticulately lacunose above, bearing the hymenium effused over the whole surface. Sporidia continuous, hyaline.—Cooke's Austr. Fungi, 249.

M. deliciosa, *Fries.*, Cke. Myco. f. 320; Sacc. Syll. viii. 13. The delicious Morel. Capitulum subcylindrical (2½ to 3 cm. long), acute, livid yellowish, base adnate; ribs longitudinal, firm, connected by transverse folds; stem even; asci cylindrical. Sporidia broadly ellipsoid, 20 x 10-11 μ.

Hab.: Amongst rotten bark near stem of gum-tree, Charley's Gully, Gladfield, *C. J. Gwyther.* This species of esculent fungus is met with in many parts of Europe, India, and Java.

HELOTIUM, Fries.

Cups waxy, rather thick; disc flattened, at first punctiform, then dilated, always open, sessile or shortly stipitate; sporidia continuous or spuriously septate, hyaline.—Cooke's Austr. Fungi, 263.

H. terrestre, *Berk. and Broome*, Linn. Trans. Cups stipitate, small, nearly plane, horn-colour, lurid, externally smooth and naked (4–5 mm. broad). Asci elongated; sporidia elliptic, shortly appendiculate at each end, uniguttulate, 10 μ long; paraphyses filiform, clavate at the tips.—*Cooke* in Austr. Fungi, and Grev. xxii. 36. In this latter he remarks:—"By some error, apparently, this species was originally described as externally *villous*, and hence was transferred by Saccardo to *Dasyscypha*, and as such was recorded in 'Handbook of Austr. Fungi'; but the specimens now received (from Gladfield), as well as those in Herb. Kew (Taylor's Range), are externally smooth and naked; hence it should be restored to its original genus *Helotium*."

Hab.: On damp earth, Taylor's Range, *Bail.*; at Gladfield, *C. J. Gwyther.*

H. citrinum, *Hedw.*, Sacc. Syll. 910; Austr. Fungi, 263. Crowded, lemon yellow, cups flattened, concave, with the short, thick, paler stem obconical (2 mm.); asci clavate, 90-100 by 8-9 μ; sporidia oblong, obtuse, hyaline, biguttulate, 10-12 by 4 μ; paraphyses filiform, not clavate at the tips.—*Cooke*, Austr. Fungi, 263.

Hab.: Mount Mistake, on wood.

No description given in 2nd Suppl. to Syn. Ql. Flora, where it was previously noticed.

BELONIDIUM, Mont.

Cups subsessile or shortly stipitate, scutellate, or infundibuliform, waxy, smooth or downy; asci elongated; sporidia elongated, multiseptate.—Cooke's Austr. Fungi, 267.

B. parasiticum, *Cke. and Mass.*, Grev. xxii. 68. Parasitic, white. Cups very minute, glabrous, concave or nearly plane, attached by a central papilla scarcely visible to the naked eye. Asci clavate; sporidia 8, subfusoid, straight, triseptate, scarcely constricted, hyaline, 22 x 4 μ. Paraphyses filiform. Near *B. minutissimum*, but cups much smaller, sessile; and sporidia different.—*C. and M. l.c.*

Hab.: On the subiculum of *Asterina*, growing upon the leaflets of *Tarrietia trifoliata*, Barron River.

XYLARIA, Hill.

X. fulvella, *Berk. and Curtis*, Cuban Fungi; Sacc. Syll. i. 1166. Clavate, rubiginose, papillate. Perithecia half-exserted, ostiola black; stipes cylindrical, pale tawny-coloured, lineato-rugose. Sporidia oblong, 7, 6 μ long.

Hab.: Eumundi, at base of dead stump in scrub, *Field Naturalists*; first met with on rotten wood at Cuba.

X. ianthino-velutina, *Mont.*, Syll. Crypt.; Sacc. Syll. i. 1282. Simple or branched, terete, apex acutely compressed. All parts clothed with long violet-brown hair. Perithecia superficial, somewhat free, depressed, ovoid at lengths opening between the hairs. Sporidia monostichous, navicular-subpyriform, 12-13 μ long.

Hab.: Barron River scrubs, on old fruit of a *Flindersia*, *E. Cowley*; found on the rotting woody legumes of *Hymenæa Courbaril* in Brazil.

X. rhizophila, *Cke. and Mass.*, Grev. xxii. 37. Stroma clavate, divided nearly to the base into 2 to 6 clubs, which are spathulate, flattened, mostly rounded at the apex, 3 to 5 c.m. long, 5-7 mm. broad, bright-brown, base rugose, smooth, rooting. Perithecia prominent; ostiola papillate, black. Asci cylindrical. Sporidia uniseriate, subfusiform, obtuse, straight or curved, uninucleate, brown, 8-10 x 2-3 μ.—*C. and M. l.c.*

Noticed in Botany Bulletin viii., but then description not to hand.

RHOPALOPSIS, Cooke.

Very densely cæspitose, clubs abbreviated, shortly stipitate or crowded together on an intricate stroma; perithecia peripherical; sporidia continuous, brown.—Cooke's Austr. Fungi, 289.

R. cetrarioides, *Well. and Curr.* (*Kretschmaria cetrarioides* in Sacc. Syll. 1489.) Given under *Hypoxylon* in Syn. Ql. Fl. 780. Stroma decumbent, laciniate, resembling in habit and mode of growth *Cetraria tristis;* lacinia dilated, multifid, passing into perithecia at the apices; perithecia densely aggregated, sometimes compressed, irregular; sporidia lanceolate, continuous, brown.—*Cooke* in Austr. Fungi, l.c.

Hab.: Trinity Bay, on wood.

R. angolense, *Well. and Currey.* (*Kretschmaria angolense* in Sacc. Syll. 1519; Cooke's Austr. Fungi, 290.) Given under *Hypoxylon* in Syn. Ql. Flora, 780. Clavate, black, bright and shining; perithecia densely aggregated; ostiola minute, a little prominent; sporidia dark-brown, ovate or slightly curved, 12-15 μ long.—*Cooke l.c.*

Hab.: Trinity Bay.

R. confusum, *Berk. and Cooke,* Grev. xii. 2. Gregarious, stipitate, simple. Heads depressed, globose, glaucous; at length black on attenuated flexuous stipes. Perithecia innate, globose; ostiole punctiform.

Hab.: Eumundi, on bark of a dead log, *Field Naturalists;* also on wood, Brazil.

HYPOXYLON, Bull.

H. (Sphæroxylon) atrosphæricum, *Cke. and Mass.*, Grev xxii. 68. Stroma erumpent-superficial, subglobose, 2 mm. diameter, separate, rarely connate, gregarious, black, externally papillate; perithecia peripherical, in one series, ovate, mamillate; asci cylindrical; sporidia fusiform, straight or curved, unequal-sided, rather acute at the ends, narrow, clear brown, 22 x 6 μ (rarely 8 μ). Externally somewhat resembling *H. coharens;* but the stroma are seldom connate, smaller than *H. argillaceum*, and black; the sporidia also are about equal in length, much narrower, and acute at the ends. There is no other species amongst the black series of *Sphæroxylon* with which the sporidia could be confounded, and no form of *H. multiforme* or *H. majusculum* to which it could be referred.—*C. and M. l.c.*

This species was noticed in Botany Bulletin viii.; but the author's description was not then to hand.

ASTERINA, Lév.

A. hoveafolia, *Cke. and Mass.*, Grev. xxii. 36. Epiphyllous. Spots black or with a brown centre, suborbicular, velvety (1-2 mm.). Perithecia usually arranged in a ring or part of a ring at the circumference, black, scutellate, fimbriate. Asci large, pyriform. Sporidia subelliptical, uniseptate, brown, the upper cell the broadest (16 x 7 μ).—*C. and M. l.c.*

This species was noticed in Botany Bulletin viii.; but the description was not then to hand.

DIMEROSPORIUM, Fuckel.

D. Tarrietiæ, *Cke. and Mass.*

Hab.: Eumundi, on leaflets of *Tarrietia trifoliolata, Field Naturalists.*

PUCCINIA, Pers.

P. Carissæ, *Cke. and Mass.*, Grev. xxii. 37. Hypophyllous. Uredospores not seen. Teleutospores. Sori small, gregarious or orbicular spots forming rings which are at length confluent, rather compact, dark-brown; spores elliptic, constricted in the centre, rounded at the ends, smooth, brown (20-22 x 16 μ), on short peduncles. Quite distinct from *P. Alyxiæ.—C. and M. l.c.*

Hab.: Gladfield, *C. J. Gwyther*; Dalby, *Dr. Thos. L. Bancroft.*
Noticed in Botany Bulletin viii.; but the description was not then to hand.

P. heterospora, *Berk. and Curtis.* (*Uromyces Thwaitesii*, B. and Br.; *U. pulcherrimus*, B. and C.) Spots determinate, purplish or yellow; sori minute, hypophyllous, soon naked, crowded in orbicular glomerules, brown; teleutospores elongated or subglobose, even, 15-27 μ diameter; incrassated about the apex, at first continuous, at length biseptate; pedicels hyaline, slender, narrowed downwards, 3-4 times as long as the spores.—*Cke.*, Austr. Fungi, 338.

Hab.: On the leaves of a native *Hibiscus* received from *Mr. J. Wedd*, St. George. This fungus has also been found on *Abutilon crispum* received from the Gulf of Carpentaria; and on *Abutilon avicennæ* from New South Wales.—*Cooke*, Austr. Fungi.

UREDO, Pers.

U. pallidula, *Cke. and Mass.*, Grev. xxii. 37. Pustules pallid, convex, gregarious, splitting irregularly, and then girt by the ruptured epidermis on both surfaces. Uredospores tawny in the mass, pulverulent, elliptical, smooth (12-14 x 8-10 μ), nearly colourless.—*C. and M. l.c.*

Hab.: Gladfield, on pods and leaves of *Cassia.*
Noticed in Botany Bulletin viii., but description not then to hand.

U. Sorghi, *Fuckel.* Sori linear, erumpent, ferruginous; uredospores obovate, olive-brown, 40-24 μ.

Hab.: On sorghum, Gladfield, *C. J. Gwyther*; on sugar-cane, Nerang, *J. F. Shirley*; from both localities, bearing *Darluca filum.*

U. Rumicis, *Schum.* Sori hypophyllous or amphigenous, surrounded by the torn epidermis, scattered or gregarious, suborbicular, smooth, of a cinnamon or pale fuscous brown; uredospores sphæroid or elliptic-sphæroid, subspinulose, yellowish, 24-33 x 18-26 μ.

Hab.: On leaves of *Muehlenbeckia*, Gladfield, *C. J. Gwyther.*

U. leguminum, *Desm.*, Cooke's Austr. Fungi 344. Pustules rounded, solitary, rather large, girt by the ruptured epidermis; uredospores ovoid, pedicellate, rough, pale-brown (20 x 18 μ). —*Cooke l.c.*

Hab.: On *Acacia* pods, *Cooke l.c.*

U. cichoracearum, *DC.*, Cooke's Austr. Fungi 344; recorded in 2nd Suppl. Syn. Ql. Flora 127. Spots obliterated or very minute, sori on both surfaces, scattered, small, orbicular, rarely confluent, often girt by the remains of the ruptured epidermis: uredospores subglobose or oblong, with short, hyaline, deciduous pedicels. —*Cooke l.c.*

Hab.: On *Bidens* and other Compositæ, near Brisbane.

U. clematidis, *Berk.*, Hook Journ. Bot. vi. 205; Sacc. Syll. 3139; *Cooke* in Austr. Fungi 344. Sori on the under surface, solitary or gregarious, pale yellow, more or less rounded, flattened; spores irregular, ovoid, clavate, quadrangular, or polygonal, epispore thin minutely granular, very pale yellowish, hyaline, 24-28 x 66-20 μ (sometimes 30 x 35 μ).—*Cooke l.c.*

Hab.: On *Clematis aristata*, *Cooke l.c.*

MELASMIA, Lév.

Perithecia dimidiate, plane, almost without a mouth, or cracking, membranaceous, black, innate in a blackened, effused stroma, often on leaves; sporules elongated, continuous, subhyaline.—*Cooke*, Austr. Fungi 359.

M. eucalypti, *Cke. and Mass.*, Grev. xvi. 75; *Cooke*, Austr. Fungi 359. Spots orbicular or confluent (2 mm. diam.), black; perithecia few, somewhat gregarious, elliptical, or lanceolate, debiscing by a fissure, then hysterium-like; sporules lanceolate, acute at each end, continuous, hyaline (15 x 5 μ), on rather long simple basidia. —*C. and M. l.c.*

Hab.: On leaves of *Eucalyptus*, Nerang Creek.
This species is noticed in the 2nd Suppl. Syn. Ql. Flora, without description.

M. Tecomatis, *Cke. and Mass.*, Grev. xxii. 37. Perithecia on both surfaces, superficial, orbicular, rugose, black (1-2 mm.), then deficient above, and marginate, disk brownish, sporules elongated, fusoid, continuous, hyaline, 16 x 2 μ.—*C. and M. l.c.*

Hab.: On leaves of *Tecoma jasminoides* at Gladfield.
Noticed without description in Botany Bulletin viii.

GLÆOSPORIUM, Mont.

Pustules nestling beneath the epidermis, discoid or pulvinate, at length sometimes erumpent, pale or brown; conidia ovate-oblong, rarely oblong, continuous, hyaline, often conglutinate and erumpent in a globule or tendril; basidia thread-like, fasciculate.—*Cooke*, Austr. Fungi.

The following species are wanting description in my former publications:—

G. Alphitoniæ, *Cke. and Mass.*, Grev. xxii. 37; recorded in Botany Bulletin viii. Epiphyllous. Spots irregular or confluent, pallid, pustules erumpent, small, gregarious on the spots, chiefly towards the centre, darker, splitting above. Conidia cylindrical, roundish at the ends, 18-22 x 4 μ, hyaline, binucleate, mostly straight. —*C. and M. l.c.*

Hab.: Gladfield.

G. intermedium, *Sacc.*, Cooke's Austr. Fungi 361; recorded in 1st Suppl. Syn. Ql. Flora 86. Pustules gregarious, punctiform, black, then erumpent ($\frac{1}{6}$-$\frac{1}{5}$ mm. diam.); conidia elongated, rounded at the ends, straight, hyaline (14-18 x 4-6 μ).—*Cooke l.c.*

Hab.: On *Hoya australis*, Tambourine Mountain, *Rev. B. Scortechini.*

G. citricolum, *Cke. and Mass.*, Grev. xvi. 3; Cooke's Austr. Fungi 361; recorded in 2nd Suppl. Syn. Ql. Flora 139. Spots dark-brown, small, rather discoid, often confluent; pustules immersed; conidia oval, continuous, hyaline, 8 x 3 μ.—*C. and M. l.c.*

Hab.: On Orange-trees, Toowoomba, *H. Tryon.*

G. glaucum, *Cke. and Mass.*, Grev. xvi. 75; Cooke's Austr. Fungi 362; recorded in 2nd Suppl. Syn. Ql. Flora 139. Spots rather orbicular on one or both surfaces, becoming glaucous, rather mealy, pustules minute, conidia profuse, soon oozing out, forming an effused mealy stratum, globose, hyaline, 6-7 μ diam.—*C. and M. l.c.*

Hab.: On foliage of indigenous shrubs at Nerang Creek.

G. Denisonii, *Sacc. and Berl.*, Sacc. Syll. 4593; Cooke's Austr. Fungi 362; recorded in 1st Suppl. Syn. Ql. Flora 86. Pustules gregarious, minutely pustulate, covered by the scarcely perforate epidermis, yellowish within; conidia oblong-cylindrical, obtuse, slightly curved, 6-8 x 1-5 μ, hyaline; basidia simple, rod-like.—*Cooke l.c.*

Hab.: On leaves of *Macrozamia Denisonii*, Tambourine Mountain, *Rev. B. Scortechini.*

G. fructigenum, *Berk.*, Gard. Chron. 1856; Sacc. Syll. 3751; Cooke's Austr. Fungi 363; recorded in 2nd Suppl. Syn. Ql. Flora 139. Pustules concentric, dull rose-colour, erumpent, with a single pore or a fringed mouth, pulvinate; conidia oblong or cylindrical, often curved, 20-30 x 5-6 μ, glandular, hyaline; basidia simple, rarely forked.—*Cooke l.c.*

Hab.: On pear-fruit, Toowoomba, *H. Tryon.*

G. musarum, *Cke. and Mass.*, Grev. xvi. 3; Cooke's Austr. Fungi 363; recorded in 2nd Suppl. Syn. Ql. Flora 139. Pustules innate-erumpent, gregarious, rather rosy; conidia elongated, ellipsoid, rounded at the ends, continuous, hyaline, 10-12 x 4 μ, glandular within.—*C. and M. l.c.*

Hab.: On bananas exposed for sale in Brisbane.

G. lagenarium, *Pass.*, Sacc. Syll. 3757; Cooke's Australian Flora 363; recorded in 3rd Suppl. Syn. Ql. Flora 126. Pustules seated beneath the cuticle, erumpent, often circinating, minute, pulvinate, somewhat rosy; conidia ovate-oblong, sometimes unequal-sided, 16-18 x 5-6 μ, continuous, cloudy, hyaline; basidia fasciculate, rather fusoid, 15-20 x 3-5 μ.—Cooke's Austr. Fungi l.c.

Hab.: On mango-fruit grown in Brisbane.

G. cucurbitarum, *Berk and Broome*, Trans. Linn. Soc. ii. p. 68; Sacc. Syll. 3758; Cooke's Austr. Fungi 363; recorded Syn. Ql. Flora 779, and 1st Suppl. 86. Spots bright-orange, depressed; conidia clavate, shortly stipitate, 10-22 μ long.—Cooke's Austr. Fungi l.c. Dr. Cooke says of this that it is scarcely more than a variety of *G. lagenarium.*

Hab.: On water-melon fruit exposed for sale in Brisbane; also on bananas in Brisbane fruitshop and on pie-melons growing at Eight-mile Plains. Specimens from each locality determined by the *Rev M. J. Berkeley* and *Mr. C. E. Broome.*

For description of *G. Lindemuthianum* (S. and M.), the French bean, *Glæosporium*, see Botany Bulletin v. 35; and *G. pestiferum* (Cke. and Mass.), the vine, *Glæosporium*, see Botany Bulletin iii. 32.

ASPERGILLUS. Mich.

A. entomophilus, *Cooke.*

Hab.: On various kinds of insects at Queensland Museum.

A. glaucus, *Link.*, Sacc. Syll. 304; Cooke's Austr. Fungi 360; recorded in Syn. Ql. Flora 777. Creeping threads floccose, branched, indistinctly septate, uncoloured; fertile threads erect, simple, nearly continuous, hyaline or glaucous, apex inflated into a spherical vesicle; conidia congregated in chains about the vesicle, seated on cylindrical hyaline basidia, 15 x 4 μ diam. Conidia globose, muriculate, at first hyaline, then glaucous, 8-10 μ diam.

Hab.: On putrescent organic matter everywhere. Has been found on living palm-leaves at times, at other times on old *Boletus*.

A. Cookei, *Sacc.* Syll.=*A mucoroideus*, Cooke, Grev. xii. 9; Cooke's Austr. Fungi 369; recorded in 2nd Suppl. Syn. Ql. Flora 141. Gregarious; mycelium white, intricately interwoven; fertile threads erect, hyaline, continuous, crowned with a large globose vesicle; basidia short, cylindrical; conidia for a long time persistent, globose, brown, 4 μ diam., produced in chains, forming a globose black capitulum.—*Cooke l.c.*

Hab.: On dead plants and leaves received from the Johnstone River.

STACHYBOTRYS, Corda.

(From *stachys*, a spike, and *botrys*, a bunch.)

Flocci septate, free; branches bearing short verticillate ramuli at their apices, forming a little head, and each terminated by a spore.

S. lobulata, *Berk.* Black, threads branching proliferously; ramuli subalternate, attenuated; apices 4 to 5-lobed; spores elliptic, echinulate, or smooth, binucleate.—Cooke's British Fungi. From the articulated creeping mycelium spring slender very minutely scabrous threads, branched proliferously; ramuli often alternate, attenuated, their apices swelling into a pyriform 4-5-lobed receptacle, from which spring elliptic spores, some of which are echinulate, others smooth, with two nuclei. The lobes are not mamillate as in *S. atra*, and the spores have no true septum.—*Berk. and Cke. l.c.*

Hab.: On the wall-paper of a Brisbane office, the wall having become damp from long-continued wet weather. The fungus is met with in several parts of Europe and North America on damp decomposing paper and linen.

By Authority: Edmund Gregory, Government Printer, William street, Brisbane.

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BOTANY BULLETIN No. X.

MAY, 1895.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

BY AUTHORITY: EDMUND GREGORY, GOVERNMENT PRINTER, WILLIAM STREET.

1895.

PREFATORY NOTICE.

—o—

In issuing the present Bulletin, I take the opportunity afforded of again expressing my thanks to those correspondents in the remote parts of the colony who have so persistently carried on the work of collecting and forwarding to me specimens of the indigenous vegetation with notes on their economic properties. By this means the work of developing our vast flora is being steadily carried on, and the economic as well as the botanical features of the plants recorded.

Being often required to determine the names of plant specimens collected in our neighbouring colony, New Guinea, I intend in future to devote a few separate pages in these Bulletins to record descriptions of the new species, or such notes as may be thought advisable upon the older plants. My list of vernacular names with their botanical equivalents given in "Catalogue of Queensland Plants" having been found of special service to the public, I have in this given an extension of the list.

F. M. B.

May, 1895.

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BOTANY:

CONTRIBUTIONS TO QUEENSLAND FLORA.

Order SIMARUBEÆ.

AILANTHUS, Desf.

A. imberbiflora, var. Macartneyi, *Bail.* (n. var.) A very large tree, exuding from the bark when wounded a copious flow of a colourless, transparent, resinous liquid. The young branchlets and inflorescence more or less covered with a yellowish mealy tomentum. Leaves slender, 6 to 9 in. long including the rather long petiole, but probably much longer on young trees. Leaflets on the leaves near to the inflorescence 3 to 13, narrow-lanceolate, about 3 in. long, membranous, very oblique, the underside pale, on petiolules of 1 to 3 lines. Panicles in the axils near the end of the branchlets (male), slender, about 5 in. long and with few short branches. Flowers singly on pedicels longer than the flowers. Calyx-lobes minute with ciliate margins. Petals glabrous, 1¼ lines long, broad-lanceolate, valvate, with thickened margins, the tips slightly inflexed. Stamens scarcely exserted; filaments flexuose, 3 times longer than the rather large nearly globular anthers. The female flowers not seen, but from the panicles of fruit to hand it is probable that the female panicles are much longer than the male; one bearing nearly ripe samara measured over 9 in. long, and had two or three rather long branches: the samara were usually in clusters of 3, about 2¼ in. long and 8 lines broad, membranous, and delicately veined, and were borne upon pedicels of about 1 in. or more.

Hab.: Forest Hill, Mackay, *W. Macartney*, January, 1895.

Although stated to be quite glabrous, so far as my observations go *A. imberbiflora*, F. v. M., is always rusty-tomentose on the very young growth; there may, however, be several forms of the tree. The present seems to differ in the more copious flow of resin from its wounded stem, more slender branchlets, and the longer pedicels to its more distantly separated flowers. This form is very likely identical with the trees growing in the scrubs at Brookfield, Brisbane River. The form growing at Rockhampton and Mount Perry has the leaves much crowded at the end of the thick branchlets; the flowers also are more clustered, on shorter pedicels, and the stamens exserted.

Order BURSERACEÆ.

BURSERA, Linn.

B. australasica, *Bail.* Carrot Wood. Inflorescence terminal, or in the upper axils in pyramidal or elongated panicles; flowers in nearly sessile clusters, deep red or purplish, when fully expanded scarcely exceeding 3 lines in diameter. Calyx-lobes green 3 or 4 orbicular. Petals 3 or 4 ovate, deep red or purplish, more than twice as long as the calyx-lobes. Stamens 6, anthers yellow, filaments very short.—**Proc. Roy. Soc. Ql. xi.**

Hab.: Eumundi.

Order LEGUMINOSÆ.

Tribe PHASEOLEÆ.

GALACTIA, R. Br.

G. varians (sp. nov.) Stems trailing from a thick fusiform root-stock, glabrous, and more or less angular. Leaves very variable in form and size, often near the base reduced to a single oblong leaflet, under 1 in. long, the larger leaves bearing as many as 12 leaflets, alternate or opposite upon the rhachis, nearly sessile, or an odd lower one upon the same leaf, with a petiolule $\frac{1}{2}$-in. long, oblong, 1 to 2 in. long, the largest nearly $\frac{3}{4}$-in. broad, very obtuse at both ends, and prominently reticulate, pale on the under surface. Peduncles terminal, nearly 1 ft. long, flower upon the upper half, distant, singly, on slender pedicels of about 3 lines. Flowers, only a few at the end of the raceme upon the specimen examined, seem to be pale-coloured, somewhat stained with purple, softly hairy on the outside of the petals. Standard nearly orbicular, 5 lines in diameter. Calyx slightly hairy, the two upper lobes combined, the three others very narrow, the middle one much longer than the others. Pod 2 in. long, straight, not flattened. Seeds about 7, smooth, of a grey colour and elegantly reticulate.

Hab.: Coolgarra, *Matthew Butler, J.P.*, who with the specimens sends the following marvellous statement about its medicinal properties:—"On the 24th December last I was sent for to make the will of an old man who was, as he thought, dying of rheumatism. . . . In a fit of abstraction he pulled up the root and ate it. Fancying it gave him relief, he pulled more, boiled it and drank the liquor. Within a week there was a marked change in him, and now (17th March) he is quite well and looks ten years younger. . . . A miner, who has been suffering for over two years from a scrofulous affection, took a decoction of this root for a fortnight, and his skin seems now perfectly clear, and he tells me he feels a new man. . . . I had a slight touch of rheumatism in the leg and tried a decoction of the root, with the result that the pain has gone and the stiffness is wearing away."

Order RUBIACEÆ.

NAUCLEA, Linn.

Flowers crowded in globose pedunculed, bracteate, solitary or subpanicled heads. Calyx-tube turbinate or obconic; lobes 5, usually tipped with valvate processes. Corolla elongate-funnel-shaped, throat glabrous; lobes short imbricate. Stamens 5, on the throat of the corolla, filaments none or short or long. Ovary 2-celled; style filiform, stigma capitate, cylindric or submitriform; ovules many pendulous on adnate ascending placentas. Fruit of 2 dehiscent many-seeded cocci. Seeds imbricate, testa winged; embryo clavate in fleshy albumen. Trees or shrubs. Leaves usually large, sessile or petiolated; stipules large, caducous or subpersistent.—*Hook.*, Fl. Brit. Inst. iii. 26.

N. Gordoniana (sp. nov.) (After P. R. Gordon, Chief Inspector of Stock, in recognition of the great interest he has always shown in the indigenous Flora, particularly the fodders, and those supposed deleterious to stock.) An erect tree of about 40 feet, with a rather thin, scaly bark. Leaves elliptic-lanceolate, obtusely acuminate, 4 or 5 in. long, and from $1\frac{1}{2}$ to 2 in. broad at the centre, tapering to a petiole of from $\frac{1}{4}$ to $\frac{1}{2}$ in., the primary veins few and distant, very oblique; the pair of leaves or bracts below the peduncles narrow-lanceolate, 1 to $1\frac{1}{4}$ in. long, and shortly petiolate. Flower-heads

solitary or 3 at the end of the branchlets, globose, and when in flower scarcely attaining 1 in. in diameter, on peduncles of about 1 in. Flowers glabrous. Calyx with very hairy, short, acute lobes. Corolla-tube slender in the lower half, then expanding upwards, lobes short, acute. Stamens 5, the filaments scarcely half as long as the anthers, style glabrous, exserted, stigma capitate. No ripe fruit to hand.

Hab.: Barron River, *E. Cowley*.

This tree is certainly in some respects related to our "Leichhardt-tree," of which there are probably more than one species; it is, however, of more slender habit, and the inflorescence I consider to agree better with the genus *Nauclea*, in which I place it, than with *Sarcocephalus*, the genus to which the common "Leichhardt-tree" belongs.

MORINDA, Linn.

M. jasminoides, *A. Cunn.* The corollas of this plant are, so far as I have observed, usually white, but here we met with heads of flowers which were purple on the outside of the corollas.—Proc. Roy. Soc. Ql. xi.

Hab.: Eumundi.

Order APOCYNACEÆ.

MELODINUS, Forst.

M. Murpe (sp. nov.) A pubescent climbing plant. Leaves 3 to $4\frac{1}{2}$ in. long, elliptic-oblong, rounded at the base, the apex elongated or somewhat abruptly acuminate, petioles very short, margins somewhat wavy, midrib and veins very hairy. Fruit on a stout curved peduncle, about 1 in. long, at or near the ends of the branchlets; oblong, 3 in. long, diameter about $2\frac{1}{4}$ in., pericarp thin, burnt-amber colour and glabrous outside when ripe; the interior spuriously divided into four masses. Seeds imbedded in a very sweet pulp, smooth, dark brown, about 5 lines long, tapering to one end, triangular with the outer side rounded, attached by the centre, the funicle ramifying and forming the divisions of the fruit. Albumen scanty. Embryo occupying nearly the whole length of the seed, the radicle longer than the oblong cotyledons.

Hab.: Russell River. *Mr. E. J. Hancock*, from whom I received the specimens, says that the fruit is eaten by the natives, their name for it being "Murpe."

Order CONVOLVULACEÆ.

IPOMÆA, Linn.

I. Muelleri, *Benth.*, Flora Austr. iv. 423. A glabrous, rather slender twiner. Leaves on rather long petioles, very broadly cordate-ovate, obtuse, with rounded basal auricles, entire, 1 to 2 in. long. Peduncle shorter or at length longer than the petioles, bearing 1 to 3 flowers on very short pedicels. Bracts very small. Sepal broad, obtuse, or scarcely acuminate, 4 to 5 lines long. Corolla apparently pink, rather above 1 in. long. Capsule globular, smooth, as long as the calyx. Seeds villous.

Hab.: Boulia, *Dr. W. E. Roth.*

Order VERBENACEÆ.

DICRASTYLES, Drumm.

D. Weddii, (n. sp.) (After Jos. Wedd.) A small erect shrub, clothed with a close white tomentum of branched hairs. Leaves opposite or scattered, linear, obtuse, about ½-in. long, with closely revolute margins. Flowers in compact head-like cymes. Bracts about as long as the calyx, ovate. Calyx nearly 2 lines long, divided to near the base into lanceolate lobes, glabrous on the inside and nearly equal. Corolla longer than the calyx, outside covered by branched hairs, the tube slender in the middle, swelled around the ovary, the upper with 5 blunt lobes, one much longer than the rest, broad and open, woolly in the throat. Stamens, only 2 in all the flowers examined bearing anthers, the others being apparently abortive; filaments longer than the corolla-tube, and hairy. Anthers large with divaricate lobes. Style with 2 long glabrous slender branches, entire portion with long branched hairs like the stamens. Fruit globose, 4-celled, with 1 seed in each cell.

Hab.: St. George, *Jos. Wedd.*

Order LAURINEÆ.

CINNAMOMUM, Burm.

C. Oliverii, *Bail.* The Sassfras-tree of the North Coast line. Inflorescence terminal, or in the upper axils, in loose elongated panicles 6 to 8 in. long; flowers in twos or threes at the end of the branchlets, the pedicels about a line long. Flower velvety, cream-coloured, perianth-tube slender, about 2½ lines long, the lobes equal, scarcely as long as the tube, marked by several longitudinal nerves. Stamens 9; the six outer ones about as long as the perianth-lobes, filaments flattened and hairy, the three inner ones short, with prominent glands upon the hairy filaments. Staminodia with sagittate heads and hairy filaments like the stamens. Style and ovary nearly or quite glabrous; stigma dilated. Berry partially sunk in the slightly enlarged calyx-tube from which the lobes have fallen. In the bark of several of these trees we found nodules of two or more inches diameter.—Proc. Roy. Soc. Ql. xi.

Hab.: Eumundi.

Order ORCHIDEÆ.

DENDROBIUM.

D. bigibbum, var. macranthum (n. var.) Stems, leaves, and peduncles the same as in other varieties of this species. Racemes of three large flowers, the sepals and petals of a heliotrope colour, the labellum especially towards the base a rich mauve. Flowers distant. pedicels white 1¼ in. long. Sepals oblong 1½ in. long, 7 lines broad, minutely apiculate, the lateral ones forming but a very short upper basal projection, the spur 4 lines long, compressed, scarcely a line in diameter. Petals rhomboid 1½ in. broad, tapering at the base to a short claw. Labellum more than three parts the length of the sepals. the middle lobe occupying about half its length, very obtuse and over ½-in. broad, the lateral lobes curving around and enclosing the column, the disk with an oblong cushion-like mass, which with the aid of a lens

is found to be formed of several irregular rows of teeth-like processes. Column very short, the side wings reaching to the top or above the anther.

Hab.: Geraldton. The above description is drawn up from a plant now (May) blooming at Bowen Park, and undoubtedly it is the most showy of all Australian orchids, its nearest ally being *D. phalænopsis*, Fitzg.

SPATHOGLOTTIS, Blume.

S. Soutteriana, *Bail.*, Proc. Roy. Soc. Ql. xi. (After William Soutter, who has taken much trouble in collecting plants of this Order from all parts, and cultivating them at Bowen Park.) Leaves crowning the pseudo-bulb 6 or 7, the outer one without lamina, the others increasing in length until the centre one attains a length (including the rather long petiole) of 1½ or 2 feet, width at broadest part about ¾-in., but usually less, tapering to fine points, and to the petioles, and prominently marked by numerous rib-like nerves. Scape slender; raceme about 3 in. long, bearing 8 or 9 light purple flowers. Bracts lanceolate 7 or 8 lines long, pedicels about 1 in. long. Sepals and petals about 5 lines long. Labellum ¾ the length of the other segments of the perianth, articulate to the base of the column close to the lateral lobes. These latter are oblong or slightly spathulate, and somewhat incurved, and on the disk between them at the upper end 2 large, thick, erect, rather spreading glabrous calli; middle lobe with a rather long claw, expanding into a somewhat flabelliform blade, the claw with densely woolly margins. Column much incurved, dilated upwards—presenting, with the anther, an almost hooded appearance.

From the above brief description it will be seen that the present species approaches in many respects the only other Australian species—*S. Paulinæ*, F. v. M. The present species, however, has narrower, more grass-like leaves. The flowers are also much smaller, and different calli.

Hab.: Stony Creek, Cairns-Herberton Railway line. I received a leaf and single bloom in February, 1893, from Mr. L. J. Nugent, and more perfect specimens last October from Mr. E. Cowley, of Kamerunga, and consider it to differ from others sufficient to rank as a distinct species. The beauty of the flowers, and great length of time they continue in bloom, make species of this genus desirable plants for cultivation.

EULOPHIA, R. Br.

E. agrostophylla, *Bail.*, Proc Roy. Soc. Ql. xi. (Name suggested by its grass-like leaves.) Rhizome of irregular form, resembling a ginger rhizome, thick, fleshy, whitish, stained here and there with purple, attaining a length of 4 in. and a breadth of 1½ in. Leaf-bearing stem slender, compressed, about 2 lines broad, with 2 long sheathing scales which cover the lower 4 or 5 in., and then 2 grass-like leaves on long petioles, together attaining a length of 2 feet but not over 7 lines broad at the widest part, prominently ribbed, 3 of these much more prominent than the others. Scape 2 feet high, slender; the sheathing scales near the base about 1 in. long, with narrow lanceolate points, the upper ones without the sheathing base, and passing into long narrow bracts like those subtending the flowers; the raceme or flower-bearing portion about 4 or 5 in. Bract ½-in. long, or a little shorter than the slender pedicel. Spur very prominent in the bud. Sepals narrow-lanceolate, appearing in the dry flowers to

have subulate points, 4½ lines long, 3-ribbed. Petals shorter and broader than the sepals, almost apiculate, 3-ribbed with branching veinlets. Labellum long as the petals of 3 blunt lobes, the middle one broader than long, the lateral ones occupying half the length of the labellum, all prominently marked by numerous branching veins which start from 3 or 4 strong raised ribs on the disk, margins slightly undulate. Column about half as long as the sepals, the dorsal lobe bearing the anther as in *E. venosa*—rather long and ovate. Pollen-masses 2, nearly globular. Capsule oval, about the size of a small gooseberry, and prominently ribbed.

Hab.: On sandy land, in shady localities of the Mackay district.—*L. J. Nugent.*

CLEISOSTOMA, Blume.

C. Nugentii, *Bail.*, Proc. Roy. Soc. Ql. xi. (After the discoverer, L. J. Nugent.) Stems short, covered by the prominently ribbed bases of fallen leaves, live leaves 2 or 3, distichous, linear-lanceolate, 1 to 2 in. long, and from 3 to 6 lines broad, sharply keeled, the longitudinal nerves only seen in the dry or partially dry state; all much blotched with deep-red or purple on the specimens examined. Racemes spike-like, erect, often longer than the leaves. Bracts small but the lower empty one rather larger than those subtending the flower, and somewhat spreading or recurved. Flowers small, numerous, on very short pedicels. Sepals somewhat spathulate, 1 line long, incurved, greenish towards the tips, the lateral ones adnate to the basal projection of the column. Petals shorter and broader than the sepals, with thick midrib but no longitudinal veins, greenish and incurved. Labellum white, as long as the petals, the basal pouch not quite so broad but as long as the rest of the labellum, with no internal appendage; the lateral lobes very short with coloured margins, embracing the column; scale in front of the saccate end or middle lobe membranous. Column short, with broad green, ciliate wings. Anther-lid purple. Pollen-masses 2, nearly spherical; caudicle bipartite. Capsule not seen. In some respects this plant resembles an *Ornithochilus*, and probably upon further examination it may have to be placed in that genus.

Hab.: Black Gin's Leap, a mountain about 16 miles north of Mackay. *L. J. Nugent.*

C. congesta, *Bail.*, Proc. Roy. Soc. Ql. xi. Stems short, the longest seen under 2. in. long, the lower part covered by the ribbed scarious bases of fallen leaves. Leaves 2 to 5 straight, linear-oblong, obtuse-acuminate, base more or less cuneate, the longest about 1½ in. long and about 3 lines broad, the veins in the live leaf obscure from the coriaceous nature of the leaf, but both the longitudinal ribs and cross veinlets plainly visible in the dried specimens. Peduncle usually shorter than the leaves, with 1 or 2 scarious sheathing bracts at the base, and 1-2 or none between these and those subtending the flowers. Flowers cream-coloured crowded at the apex forming a head but opening one at a time. Bracts broad, fleshy, pointed, segments of flowers all incurved, resembling those of some of our small-flowered *Dendrobiums*. Pedicels 3 lines long. Sepals broad-lanceolate about 3 lines long. Petals narrow-linear shorter than the sepals. Labellum long as the sepals, the lateral lobes long and broad, the middle lobe reduced to a truncate end to the labellum, the whole upper surface covered with a dense short white wool, the central scale broad with

ciliate margins and recurved coloured point. Spur broad, obtuse, stained with yellow and red, plate at orifice transverse. Column white, semi-terete, scarcely one-third the length of the sepals. Pollen-masses oval, yellow. Capsule slender, $2\frac{1}{2}$ in. long.

Hab.: Cairns, *L. J. Nugent.*

Order SCITAMINÆE.

ALPINIA, Linn.

A. cærulea, var. Arundelliana, *Bail.*, Proc. Roy. Soc. Ql. xi. This variety is much smaller than the common form, the margin of the leaves are wavy, and the labellum of the flower, besides being small, is of a rosy-red colour. The fruit only differs in its smaller size. Although difficult to describe in words, the distinction between these two forms is very evident when seen in the scrubs growing side by side, as they do in this locality.

Hab.: Eumundi. This variety is named after Mr. E. H. Arundell, a resident of the district, who has rendered much assistance towards collecting specimens of the Eumundi plants.

Order AMARYLLIDEÆ.

CRINUM, Linn.

C. Douglasii, *Bail.* (n. sp.) A handsome plant, in general appearance before sending up its flower-scape reminding one of a *Furcræa*. It does not seem to form a columnar stem like *C. asiaticum*. Leaves numerous, deep-green, about $2\frac{1}{2}$ ft. long and 4 or 5 in. broad, tapering from above the middle to a sowewhat blunt point, the longitudinal nerves numerous, crossed by horizontal veins, which, from being very prominent, give a tesselated appearance to the upper face of the leaf. Scape somewhat compressed, and darkly mottled, about as long as the leaves, bearing an umbel of about 20 flowers on rather thick pedicels, which are about as long as the ovaries, the involucral bracts membranous, about $4\frac{1}{2}$ in. long, and $\frac{3}{4}$-in. broad at the base. Perianth-tube about $5\frac{1}{2}$ in. long and scarcely exceeding $2\frac{1}{2}$ lines in diameter. Segments of the limb shortly pointed, $3\frac{1}{2}$ in. long, those representing the sepals rather the longest and broadest, $\frac{1}{2}$-in. wide in the broadest part; the margins of these are also undulate, and give a frilled or crenulate appearance; the margins of the inner segments have smooth, not wavy, margins. Filaments about $\frac{3}{4}$ the length of the segments, slender, purplish red except towards the base; anthers very slender, $\frac{1}{2}$-in. long. Style as long as the segments, purplish except near the base. Stigma of 3 short fringed lobes.

Hab.: The plant from which the above description has been drawn up is now (January) flowering in Mr. L. A. Bernays's garden, Brisbane. It was received by that gentleman two or three years ago from the Hon. John Douglas, Thursday Island. It seems to me quite distinct from any named species of the genus, so at Mr. Bernays's request I have named it in honour of his friend.

Order PANDANACEÆ.

FREYCINETIA, Gaudich.

F. Gaudichaudii, *R. Br.* Specimens of this species, bearing the female inflorescence were obtained for the first time so far south, its previously recorded southern habitat being Rockhampton; and no male inflorescence has so far been met with in Australia.

The bracts on the specimens collected were nearly white and very deciduous, the outer ones not exceeding 2 in. in length, the innermost ones much smaller, very narrow, and quite membranous.—Proc. Roy. Soc. Ql. xi.

Hab.: Eumundi.

F. excelsa, *F. v. M.* Specimens of the male inflorescence of this species were obtained. The outer bracts are nearly as long as the leaves, which they resemble except for their broad coloured sheathing bases, which surround the base of the inflorescence. The other bracts are collected into three bundles and are, except for their green tips, of a deep red colour, and form a star of three rays several inches in diameter, bearing in its centre the spike of stamens, the filaments of which are short, and bear pale-coloured 2-celled obtuse anthers.—Proc. Roy. Soc. Ql. xi.

Hab.: Eumundi.

Order NAIADEÆ.

POTAMOGETON, Linn.

P. pectinatus, *Linn.* Stems very slender, repeatedly dichotomous. Leaves all submerged, very narrow-linear, 2 to 3 in. long, 1-nerved, most of them dilated at the base into a rather long sheath, which is scarious at the edge and often projecting at the top into 2 small scarious lobes, the sheathing stipules of the other species wanting, or rarely sheathing the base of the peduncle. Peduncles usually bearing several clusters of 2 or 3 flowers at some distance from each other, forming a slender interrupted spike, rarely reduced to a single terminal cluster. Nutlets of *P. obtusifolius* or rather smaller.—Flora Austr. vii. 173.

Hab.: Still waters, Jimbour, *C. J. Gwyther.*

Order LICHENES.

(This Lichen list has been prepared for me by our local lichenologist, Mr. John Shirley.)

The following plants, determined by Dr. Jean Müller, of Geneva, are reported by him as natives of Queensland.

PYRENOCARPEÆ.

(Mull. Arg. Consp. Syst. Lich. Nov. Zeal., p. 15.)

Tribe DERMATOCARPEÆ, Mull. Arg. Pyrenoc. Cub., p. 377.

DERMATOCARPON, Mull. Arg. Pyrenoc. Cub., p. 377.

D. miniatum, *Th. M. Fries,* Arct., p. 253. Thallus simple, firm-coriaceous, peltate, umbilicato-affixed, large, expanded, rotundato-lobate to undulate or crenate-lobate, smooth or minutely albo-pruinose-granulate, under surface smooth or rugulose, fulvous; apothecia minute, very numerous, embedded; epithecium slightly elevated, brown; spores 8, colourless, oblong or ellipsoid, simple, 15-18 x 6-10 μ.

Syn.: *Lecidea miniata,* L.

Hab.: On rocks, Toowoomba, *Hartmann.*

TRIBE PYRENULÆ, Mull. Arg. Pyr. Cub., p. 381.

SUBTRIBE VERRUCARIÆ, Mull. Arg. Lich. Gen., p. 73.

ARTHOPYRENIA, Mull. Arg. L.B., 612.

SECTION EUARTHOPYRENIA.

A. atomaria, *Mull. Arg.* Toowoomba, *Hartmann.* Thallus cinerascent, thin; apothecia very minute, subglobose, emerso-sessile, somewhat shining: epithecium umbilicate; perithecium dimidiate; spores 8, fuscous, broadly oblong, 1-septate.

SECTION MESOPYRENIA.

A. oculata, *Mull. Arg.* Thallus shining white, very thin, from smooth to powdery; apothecia ·6 mm., elato-convex, clothed by the thallus, then nude and almost black, vertex minutely impresso-ostiolate, and commonly minutely oculate with a vestige of the thallus; perithecium deficient or thin at the base, and obtuse at the angles: paraphyses connected; spores 2-seriate, 8, 14-16 x 7-8 μ, ovoid, equally 2-4-locular.

Hab.: On bark, by *Dr. C. Knight.*

A. fallacior, *Mull. Arg.* Thallus indicated by a white halo, usually evanescent, margin effuse, not at all nigro-limitate, destitute of melagonidia; apothecia ·6 mm. wide, scattered, innate-sessile, orbicular and elliptical, deplanate hemispherical, wholly and thinly thalline-velate, and greyish-black; perithecium black, dimidiate; paraphyses numerous, capillary, loosely connected; asci cylindrical-ellipsoid; spores 8, 2-seriate, 18-20 x $4\frac{1}{2}$-$5\frac{1}{2}$ μ, broadly dactyloid. 2-locular.—*Dr. C. Knight*, No. 109.

SECTION ACROCORDIA.

A. limitans, *Mull. Arg.* Thallus thin, cinereous, or argillaceous. or olivaceous, maculate, bordered by a nigro-fuscous line; apothecia ·5-·8 mm., base innate, apex nude, black, shining, depresso-hemispherical; base complete; spores 8, 1-serial, 25-30 x 8-15 μ, straight or incurved, 1-septate.

Syn.: *Verrucaria limitans*, Nyl. in Flora, 1866, p. 295.—*Dr. C. Knight*, Nos. 26, 47-9, 321.

A. consobrina, *Mull. Arg.* Thallus very thin, or indicated by white spots; apothecia rather prominent; perithecium entire, black. or attenuate or almost colourless beneath; spores colourless, ellipsoid, 1-septate, 23-32 x 9-11 μ; paraphyses slender, crowded.

Syn.: *Verrucaria consobrina*, Nyl., Lich. Nov. Cal.

Hab.: On bark, *Dr. C. Knight*, No. 325.

SECTION ANISOMERIDIUM.

A. extans, *Mull. Arg.* Thallus pallid argillaceo-albid, thinly submaculer, shining; apothecia ·6 mm., black, nude, emerso-hemispherical, at length the vertex papillate; perithecium slightly depresso-globose, base complete; spores 8, obovoid, 23-25 x 10-13 μ, base acute, 2-locular, inferior loculus shorter and narrower.

Hab.: On bark, by *Dr. C. Knight*, No. 43.

PORINA (Ach.), Mull. Arg. L. B., 644.

*** Spores 20-35 μ long, 3-5 μ wide.**

P. africana, *Mull. Arg.*, is *P. limitata*, C. K.

P. tetraceræ (Ach.), *Mull. Arg.* Thallus cinereous to luteo-fuscous, smoothish or subrugulose; apothecia in glabrous verrucæ, apex nude, shining, subpapillate, ostiola pallid or fuscescent; spores fusiform, **7-septate, 25-30 x 7-8 μ.**

Syn.: *Verrucaria nana*, Stirton, Bail., No. 785.

P. variegata, *Fee.* Thallus green, smooth, margined by a thick black hypothalline line; apothecia as in *P. tetraceræ*, but smaller and more slender, and usually with obscure brown or blackish ostiola; **spores 42 x 5-6 μ, 7-septate.**

Hab.: Trinity Bay, *Sayer*.

P. rudis, *Mull. Arg.* Syn.: *P. mastoidea*, var. *rudis*, M.A., Lich. Fl. Qd., p. 170.

P. internigrans, *M.A.* Thallus as in *P. mastoidea* (Ach.), Mull. Arg. Spores 9-septate, 70-100 x 15 μ. Nylander in Lich. Andam., p. 19, calls this a subspecies of *P. mastoidea*.

Hab.: Trinity Bay, *Sayer*.

P. glauca, *Mull. Arg.* Thallus plumbeo-glaucous, thin and smooth, shining, at length readily desquamescing; apothecia ·8 mm. wide, about one-third emergent, nano-subhemispherical, concolorous, gradually sloping to the encircling thallus, vertex fulvescent, usually nigro-ostiolate; spores 8, very robust, 80-95 x 10-20 μ, 7-13-septate.

Hab.: Trinity Bay, *Sayer*.

P. subargillacea, v. nigrata, *Mull. Arg.* Apothecia placed in a black maculiform hypothallus, the thallus having fallen away. Perithecia dimidiate.

Hab.: Toowoomba, on bark, *Hartmann*.

P. rhaphidospora, *Mull. Arg.* Syn.: *Verrucaria rhaphispora*, C.K.

PHYLLOPORINA, Mull. Arg., Lich. Epiphyll., No. 50.

Thallus everywhere crustaceous; gonidia phyllactidial; apothecia angiocarpous, simple; paraphyses capillary, not anastomosing; spores hyaline, transversely divided.

P. epiphylla (Nyl.), *Mull. Arg.* Junior plagulæ suborbicular, argillaceo—or flavido—virent, usually confluent in broad patches, closely adnate, but readily peeling off; apothecia ·3 mm., deplanate-conical, or at length convex-conical, usually thalline clothed and concolorous, but at times somewhat golden in colour; vertex occasionally fusco-nudate, base broad, truncate, within hyaline; paraphyses numerous, free, capillary; spores 8, 7-septate, 24-38 x 3-4½ μ.

Hab.: Bellenden-Ker, *Bailey*, No. 483, pro. p.

POLYBLASTIA, Th. M. Fries, Polyb., n. 8.

P. gregantula, *Mull. Arg.* Thallus white, farinulent, very thin; apothecia commonly 2-4 clustered, and partly irregularly confluent in greyish spots, black, depresso-conical, base clothed, ·5 mm. wide, above

rather nude, base nigro-dilatate; perithecium with base complete; asci 2-spored; spores 38 x 14 μ; locelli in 8 series, with 4 cells in each central row. Almost resembles a *Tomasellia*.

Hab.: On bark, *Dr. C. Knight*, No. 298.

P. geminella, *Mull. Arg.* Thallus within the bark, showing as a very thin cretaceo-subfarinose frosting, or evanescent; perithecia ·3-·4 mm. wide, depresso-spherical, slightly emergent and strongly pulveraceo-velate, apex very minutely or not at all papillate, within pale; asci 2-spored, obovoid-cylindrical; spores hyaline, 25-50 x 16-20 μ.—L.B. 47. *Dr. C. Knight*, without number.

MICROTHELIA, Körb. Syst., p. 372.

* Spores 2-locular.

M. obovata, *Mull. Arg.* Syn.: *Pyrenula obovata*, Shirley, Lich. Flora Qd., p. 176.

M. brisbanensis, *Mull. Arg.* Thallus albo-testaceous, very thin, smooth; apothecia ·8 mm. wide, black, smaller ones flattish, then hemispherical and emersed, nude, subopaque; perithecium with flattened base, the lower margins produced, very attenuate below the nucleus; spores 2-seriate in ascus, 8, 23-25 x 8-10 μ, finally nigro-fuscous, oblong-obovoid, 2-locular; loculi equal or the lower one shorter and narrower.

Hab.: On bark, *Shirley*, No. 1566.

** Spores 4-locular.

M. alba, *Mull. Arg.* Thallus whitish-green, very thin and smooth; apothecia ·5-·6 mm., when young small and with a greyish layer overspread, at length blackish and broadly hemispherical; perithecium at length subglobose, base truncate, beneath the nucleus wanting or very thin; paraphyses connected; spores 8, 2-seriate in ascus, 25-30 x 9-10 μ, oblong-ellipsoid or obovoid, equally 2-4-locular.

Hab.: On bark, *Dr. C. Knight*, without number.

M. queenslandiæ, *Mull. Arg.* Thallus very thin, smooth, farinulent or hardly visible; apothecia ·8-1 mm., finally nudate-nigrate, hemispherical; perithecium subplane and dilatate at the base, beneath the nucleus complete but thin; spores 8, 2-seriate, oblong-ellipsoid, 40-48 x 14-17 μ, equally 2-4-locular.

Hab.: On bark, by *Dr. C. Knight*, Nos. 5, 29, 56.

M. subgregans, *Mull. Arg.* Thallus white, very thin, subfarinulent or wanting; apothecia ·4 mm., globose, emerging to about one-fourth the height, apex nudate, black, rotundate-obtuse, solitary or 2-5 in groups; perithecium everywhere complete; spores 2-4, 40-50 x 15-20 μ, oblong-ellipsoid, equally 2-locular, or the loculi again towards the extremity divided, when the ultimate loculi are much smaller than the intermediate ones.

Hab.: On bark, *Dr. C. Knight*, No. 315.

M. Shirleyana, *Mull.*| *Arg.* Thallus formed of smooth brown spots; apothecia ·6-·8 mm., scattered or 2-3 confluent in groups, black, half or more immersed, nano-hemispherical or conical-hemispherical, obsoletely thalline-velate, about the middle angulose-dilatate, beneath

complete and the base moderately convex; spores in two series in asci, 8, oblong-ellipsoid, at both ends obtuse, 4-locular, from hyaline to fuscous, 12-15 x 5-6 μ, dissepiments at length deeply fuscous.

Hab.: On bark, *Shirley*, No. 1776.

PYRENULA, Stitz. Flecht., p. 148.

1. Spores 4-locular.

A. Perithecium hemispherical, below subulate-dilatate, base incomplete or very thin.

P. velatior, *Mull. Arg.* Thallus with pallid argillaceous epidermis, smooth, bordered by a broad cæruleo-nigrescent zone; apothecia depresso-hemispherical, ·6 mm. wide, thalline-velate, slightly emergent; perithecium thick, black, base wanting; paraphyses free; spores 8, 1-seriate, 14-15 x 5-6 μ, fusiform-ellipsoid, 4-locular.

Hab.: Trinity Bay, *Sayer*.

P. oxyspora, *Mull. Arg.* Thallus rufo-fuscous, maculate; apothecia ·7 mm. wide, deplanate pyramidal, semi-emersed, above nude, black, rather shining, vertex neither umbonate nor umbilicate; perithecium dimidiate, or base very thin and complete, below alate-dilatate; spores 8, 1-seriate, fusiform, at both ends abruptly acuminate, 4-locular, between the loculi slightly constricted, 18-23 x 7-8 μ.

Hab.: Trinity Bay, *Sayer*.

B. Perithecium sub-conico-hemispherical, beneath complete.

P. indusiata, *Mull. Arg.* Thallus glaucous, very smooth, oleose-nitidous; apothecia immersed, conical-hemispherical, vertex slightly emergent, clothed by the subpellucid thallus, at length glauco-nigricant, nigro-perforate; perithecium with thick complete base, beneath convex; spores 8, generally in 1 series, from hyaline to fuscous, at both ends obtuse, 4-locular, 12-15 x 5-6½ μ.

Hab.: On bark, *Shirley*, No. 1878.

C. Perithecium subglobose, base complete. 1. Spores 13-20 μ long.

P. subcongruens, *Mull. Arg.* Thallus barely visible, whitish, farinulent, usually evanescent, hypothallus with the cortex brownish, maculiform; apothecia to 1 mm., about one-third innate, emergent part hemispherical, obtuse, sordid black, opaque, at length shining above; perithecium complete not winged; spores 8, 1-seriate, 13-15 x 7-8½ μ, broadly ellipsoid, at both ends broadly rotundate obtuse, 4-locular. Near *P. finitima*, Mull. Arg.

Hab: On bark, *Dr. C. Knight*, Nos. 121, 123, 135, 147.

P. Bonplandiæ, *Fee.* Thallus levigate and equal; apothecia ·6 mm., in great part emersed, hemispherical, nude, black, rather shining; base broad, flat, not attenuate; spores 8, in narrow asci, usually in one series, globose-ellipsoid, 14-16 x 8-11 μ, 4-locular, terminal loculi small.—L.B. 894.

Syn.: *P. dispersa*, Mull. Arg.; *P. aspistea*, Ach.

Hab: On bark, Trinity Bay, *Sayer*.

P. microcarpoides, *Mull. Arg.* Thallus pure white, thin, smooth, rimulose; apothecia black, semi-emersed, globose or depresso-globose, the nude portion black, shining, hemispherical; perithecium complete, the base moderately thin; spores 8, oblong-ellipsoid, at both ends obtuse, 4-locular, 16 x 7 μ.

Hab. On bark, *Shirley*, No. 1872.

P. porinoides, *Ach.* Thallus whitish, nigro-limitate; apothecia wholly immersed, ·4 mm. wide, globose, everywhere black, vertex nigro-ostiolate; perithecium black and thick; paraphyses capillary, free; asci linear, 1-seriate, 6-8 spored; spores 16 x 7 μ, 4-locular.—L.B. 901.

Syn.: *P. mollis*, Fee.

Hab.: On bark, *Shirley*, Nos. 1869 and 1880.

2. Spores 20-40 μ long.

P. mastophorizans, *Mull. Arg.* Thallus olivaceous, smoothish apothecia globose, black, apex nude and shining, shortly emergent from thick hemispherical thalline protuberances, truncate, concolorous with thallus, and smooth or slightly gibbose unequal; spores 8, 4-locular, 25-34 x 10-14 μ.

Hab.: On bark, *Bailey*, No. 499, pro. p.

P. pinguis, var. emergens, *Mull. Arg.* Syn.: *Verrucaria punctella*, var. *exstans*, Nyl.; *P. punctella*, var. *emergens*, M.A., Lich. Parag., No. 246. Differs from the type in the apothecia, which are enclosed in thalline protuberances, being often at length denudate and slightly emergent; spores 22-38 x 10-16 μ.

Hab.: On bark, *Dr. C. Knight*, Nos. 125, 138, 142.

P. adacta, var. cinerascens, *Mull. Arg.* Thallus pallid or cinerascent, at length the surface leprose-sorediose.

Hab.: On bark, *Shirley*, Nos. 1642 and 1647.

P. sexlocularis, *Mull. Arg.* Thallus pallid or pallid-flavescent, determinate by an obscure line or indeterminate, maculate; spores 6-locular, 22-32 x 9-11 μ. Syn.: *V. subvariolosa*, C.K.

Hab.: On bark, *Dr. C. Knight*, Nos. 44, 52.

ANTHRACOTHECIUM, Mass. Compar., p. 49.

Section I.—Euanthracothecium, Mull. Arg. L.B. 1265.

* Spores 30-80 μ long.

A. aurantium, *Mull. Arg.* Syn.: *Verrucaria aurantia*, Eschw.

Hab.: On bark, *Dr. C. Knight*, No. 124; *Shirley*, Nos 1775, 1881.

** Spores 20-30 μ long, from 4-locular to parenchymatous, cells fewer in ranks than the preceding, usually about 4.

A. denudatum, *Mull. Arg.* Thallus resembles that of *A. confine*, white or whitish, thin, opaque, obscurely margined; apothecia mastoid, prominent, denudate, ostiola punctiform, black, ·3-·5 mm.; spores 8, fuscescent, ellipsoid, 8-12 loculate, with 4 cells in a row, 11-20 x 7-11 μ.

Hab.: Toowoomba, *Hartmann.*

A. denudatum, var. ochrotropum, *Mull. Arg.* Thallus or maculæ of the thallus ochraceo-aurantiacous or ochraceo-rubent, or ochraceo-albid, the colour deeper around the apothecia.

Hab.: Trinity Bay, *Sayer.*

Section II.—Porinastrum, Mull. Arg. L.B. 1266.

A. oligosporum, *Mull. Arg.* Given by a typographical error in Vic. Naturalist, No. 4, p. 95, as *A. strigosporum.*

Hab.: Herbert River, *H. A. Wickham.*

SUBTRIBE TRYPETHELIEÆ, Mull. Arg. Pyr. Cub., p. 376.

TOMASELLIA, Mass., Flora, 1856, p. 283.

T. queenslandica, *Mull. Arg.* Thallus, with fulvescent or subfuscescent pallid epidermis, macular, thin; stromata variously oblongate, convex, black, ·8 mm. wide, formed from apothecia usually closely connate; at the sides moderately undulate, wholly nude; ostiola very fine, slightly depressed, white; perithecium with complete base; paraphyses loosely connected, firm; spores in narrow asci, 1-seriate, 8, 20 x 7 μ, ellipsoid-fusiform, equally bilocular.

Hab.: On bark, *Dr. C. Knight*, No. 46.

TRYPETHELIUM, Trev., Syn. Gen. Tryp., p. 19.

T. tropicum, var. nigratum, *Mull. Arg.* Thallus black.

Hab.: Bellenden-Ker, on branches, *Bailey*, No. 539, pr. p.

T. infuscatum, *Mull. Arg.* Thallus pallid, very thin, smooth; stromata nigro-fuscous, opaque, sublinear-oblong, angulose, anastomosing, slightly or not at all emergent, above flattish, within rather pallid, many fruited; apothecia black, entire, lower part thin, the upper thick and often in part connate, ·3-·4 mm. wide; ostiola reaching the surface of the stromata as brown punctures, circled with a pallid ring; paraphyses loosely connected; spores 8, in asci irregularly biseriate, 27-30 x 10 μ, 4-locular.

Hab.: On bark, Bellenden-Ker, *Bailey*, No. 599.

T. virgineum, *Mull. Arg.* Thallus rufescent-fuscous, macular, very thin, smooth; stromata nano-hemispherical, somewhat regularly orbicular, here and there geminate or ternately confluent or solitary, outwardly and inwardly white, smooth, rather shining, minutely nigro-ostiolate; ostiola small, slightly depressed; perithecium black, below thin; paraphyses loosely connected; asci biseriate, 8-spored; spores 36-40 x 10-11 μ, fusiform, 9-11-locular.

Hab.: On bark, *Dr. C. Knight*, No. 351.

MELANOTHECA, Fee, Ess. Suppl , p. 70.

M. oxyspora, *Mull. Arg.* Wholly as regards thallus and apothecia similar to *M. achariana*, Fee, but spores much larger, 29-37 x 11-15 μ, broadly fusiform, and subcuspidate acuminate, not at both ends rotundate obtuse. Even in their juvenile hyaline state the spores are at both ends acuminate.

Hab.: On bark, *Dr. C. Knight*, No. 127.

M. cruenta, *Mull. Arg.* Syn.: *M. rubra*, C. Knight.

Hab.: Ithaca Creek, Bellenden-Ker, *Bailey*, Nos. 539, 783.

M. rubescens, *C. K.* Syn.: *Microthelia Shirleyana*, Mull. Arg.

Hab.: Sankey's Scrub, *Shirley*, No. 1776.

BOTTARIA, Mass., Misc. Lich., p. 12.

B. umbilicata, *Mull. Arg.* Syn.: *Trypethelium umbilicatum*, C. K.

Hab.: On bark, *Hartmann*, Toowoomba.

SUBTRIBE PLEUROTHELIEÆ, Mull. Arg. Pyr. Cub., p. 387.

PLEUROTREMA, Mull. Arg., Pyr. Cub., p. 388.

P. pyrenuloides, *Mull. Arg.* Thallus with fulvescent whitish epidermis, macular, thin, smooth; apothecia usually nude, emergent, ·6-·7 mm. wide, sub-hemispherical, orbicular or in part slightly elongate, black, opaque, minutely ostiolate, in all parts shining; perithecium with base complete, but commonly attenuate; nucleus oblique or occasionally horizontal; paraphyses connected; spores 8, 1-seriate, ellipsoid-subfusiform, 28-32 x 8-11 μ, equally bilocular.

Hab.: On bark, *Dr. C. Knight*, Nos. 49 and 314.

SUBTRIBE ASTROTHELIEÆ, Mull. Arg. Pyr. Cub., p. 382.

PARMENTARIA, Fee Meth., p. 24.

*** Spores large, 2 in ascus.**

P. subastroidea, *Mull. Arg.* Thallus glauco-pallid, smooth, shining; apothecia roseate, similar to those of *P. astroidea*, Fee, prominent, above nude, black, separate, globose-pyriform, ostiola small, brown; perithecium complete, sub-horizontal; spores 2, brown, 160 x 35 μ, closely parenchymatous.

Hab.: On bark, *Shirley*, No. 1863.

P. subastroidea, var. subsimplex, *Mull Arg.* Perithecia almost wholly solitary and similar to those of *Pleurothelium australiense*, but here and there astroid-clustered, but colour of thallus, &c., wholly as in the type.

Hab.: On bark, *Shirley*, No. 1878.

P. toowoombensis, *Mull. Arg.*, Lich. Exot. hb. Vindeb, No. 51.

Hab.: Toowoomba, *Hartmann*, No. 51.

P. interlatens, *Mull, Arg.* Thallus indicated by flavid pallescent spots; apothecia indicated outwardly by pallid or fuscescent or finally blackish ostiola; perithecium entire, black, ·5-·9 mm. wide, usually connate in twos; spores 2, fuscous, oblong, parenchymatous, 85-160 x 30-55 μ.

Hab.: On bark, *Shirley*, Nos, 1769, 1868, pr. p.

P. grossa. *Mull. Arg.* Thallus fulvescent-pallid, cartilagineous, smooth, reticulately rugose; areolar for the greater part, ampullaceo-tuberculiform and fertile, bearing apothecia immersed at the apex or side, or profoundly covered, 2 mm. wide, within white; apothecia often conjoined in threes, sub-horizontal and slightly nudate, or solitary and variously immersed, wholly black; spores 2, 110-115 x 30-35 μ, copiously multicellular.

Hab.: On bark, *Dr. C. Knight*, No. 100.

Order FUNGI.

MUTINUS, *Fries.*

M. pentagonus, *Bail.* (sp.nov.) (Name referring to 5-angled receptacle.) Stem prominently 5-angled, about $\frac{3}{4}$ in. in diameter, salmon-coloured, wrinkled between the angles, length from top of volva to base of the spore-bearing portion $2\frac{1}{2}$ in., this latter conical but showing the angles, 1 in. long, terminated by a flattened salmon-coloured

sporeless beak. Sporiferous pulp dark olive. Volva smooth, white, pitcher-shaped, about 2 in. long, and 1 in. wide at the base. Mycelium consisting of a few delicate threads. (Fig. about natural size.)

Hab.: On a flower border in a Brisbane garden. Fœtid, but very beautiful; only a single specimen found.

M. annulatus, *Bail.* (sp. now.). (Spore-bearing portion ringed.) Entire length including volva 2½ in. Receptacle terete, diameter at base about 2½ lines, from thence tapering to a pervious apex of about ½ line diameter. Spore-bearing portion annulated, nearly one-half the entire length of receptacle, red-ochre-coloured; sporeless portion pure white. Volva globose, white, about 5 lines in diameter, shortly splitting into irregular lobes. (Fig. about natural size.)

Hab.: Amongst decaying vegetable matter at Eumundi, *Bailey* and *Simmonds*.

The only specimen met with was lost in forwarding to Dr. M. C. Cooke. The above description is from notes and sketch of plant made at the time. The nearest allied species is *M. Watsoni*, Berk.

M. Watsoni, *Berk.*, in Cooke's Handbook of Austr. Fungi, 213. About 2½ in. high, spore-bearing portion conical, one-fourth the length of the entire receptacle, minutely veined, red, about ¼-inch diameter at the base, pervious at the apex.—*Cooke l.c.*

Hab.: On the ground, Burnett River, *Watson*.

M. papuasius, *Kalch.*, in Cooke's Handbook of Austr. Fungi, 214. About 3-4 in. high. Receptacle thin and slender (3-4 mm. diam.), pallid. Spore-bearing portion ovate-conical or somewhat pear-shaped, thicker than the stem, even, black.—*Cooke l.c.*

Hab.: On the ground, Rockhampton, *A. Thozet*.

M. discolor, *Kalch.*, in Cooke's Handbook of Austr. Fungi, 214. Stem cylindrical, orange; spore-bearing portion one-sixth of the whole receptacle, broad, thimble-shaped, lower margin extruded, free, adnate above to the stem; apex at first closed, then pervious, yellowish-grey, or at length turning black, delicately reticulately rugose.—*Cooke l.c.*

Hab.: On the ground, *Wigton*.

GEASTER, Mich.

G. limbatus, *Fries.* Bordered Geaster. Outer peridium coriaceous, expanded, multifid; interior slightly constricted, and then swollen at the base, without any groove round the top of the peduncle, into which it passes gradually; mouth fimbriato-pilose, depressed, rather acute.—*Cooke*, in British Fungi.

Hab.: Gladfield, *C. J. Gwyther*.

USTILAGO, Pers.

U. sorghi, *Link.* Pori black or dark brown, roughly pulverulent, spores globose, oblong, often angular, 5-9½ x 4-5½, furnished with a smooth, yellowish-olive-brown epispore; promycelium cylindrical, constricted near the base, sporidioles numerous, oblong.

Hab.: Gladfield, on inflorescence of sorghum, *C. J. Gwyther*.

PHYLLOSTICTA, Pers.

P. circumscissa, *Cooke.* Shot-hole Fungus. On both surfaces; spots orbicular, rufous-brown, at length falling out and leaving round holes, perithecia few, minute, innate; sporules elliptic, 8 x 2 μ.

Hab.: On cherry leaves at Accommodation Creek, and on apricot leaves in other localities.

PHOMA, Fries.

P. bambusina, *Speg.*

Hab.: On stalks of a seedling sugar-cane growing at Bowen Park.

CAMAROSPORIUM, Schultz.

Perithecia erumpent, simple, often papillate. Sporules ovoid-oblong or fusoid, 2 or many septate, muriform, coloured.—*Cooke*, Austr. Fungi, 355.

C. punctiforme, *Cke. and Mass.* (sp. nov.). Perithecia gregarious, minute, punctiform, papillate, black, just visible to the naked eye. Sporules ovoid or oblong, obtuse, cruciately or muriformly septate, not contracted, fuliginous, 15-18 x 10 μ.

Hab.: On fruits of a saltbush.

ASCHERSONIA, Mont.

A. oxyspora, *Berk.*, Sacc. Syll., iii., 3321. Stroma floccosely expanded at the base, slightly cylindrical, waxy, depressed (2 mil. diam.), peach-coloured, or flesh-coloured. Cells few, irregular, large, convolute. Sporules oblong, 10-15 μ long, finely apiculate at each extremity.

Hab.: On leaves of *Cinnamomum Oliveri*, determined by Dr. C. M. Cooke.

GLŒOSPORIUM, Mont.

G. palmarum, *Cke. and Mass.* (sp. nov.). Spots orbicular or elliptical (1 c. m), tawny or brown, darker at the periphery; pustules small, erumpent, at length pulverulent. Conidia elliptical, hyaline, continuous 12-14 x 5-6 μ. Basidia rather long and distinct, flexuous, hyaline.

Hab.: On leaflets of *Archontophœnix Cunninghamii* at Eumundi.

G. cinnamomi, *Cke. and Mass.* (sp. nov.). Spots suborbicular, sometimes bullate, rarely confluent hypophyllous, causing the leaves to become flaccid. Pustules gregarious, tawny, minute, at length pulverulent. Conidia elliptical, hyaline, 12-15 x 4 μ, on distinct basidia.

Hab.: On leaves of *Cinnamomum Oliveri* at Eumundi. Very destructive to the foliage.

G. periculosum, *Cke. and Mass.* Pustules occupying the whole or part of the surface of the ripe fruit, forming sulphur-coloured nodules beneath the cuticle ($\frac{1}{2}$-m. diam.), sporules elliptic-oblong, straight or curved, continuous obtuse at the ends, hyaline, 14-15 x 4 μ. The entire fruit penetrated with stout and branched hyphæ reaching to 6-8 μ diam. Sporophores cylindrical, 6-8 x 2 μ.

Hab.: Infesting the fruit of *Rhodomyrtus macrocarpa* at Cairns, which if eaten in this state is considered to cause blindness and at times death. This is a matter worthy of the attention of our medical men.

FUSARIUM, Link.

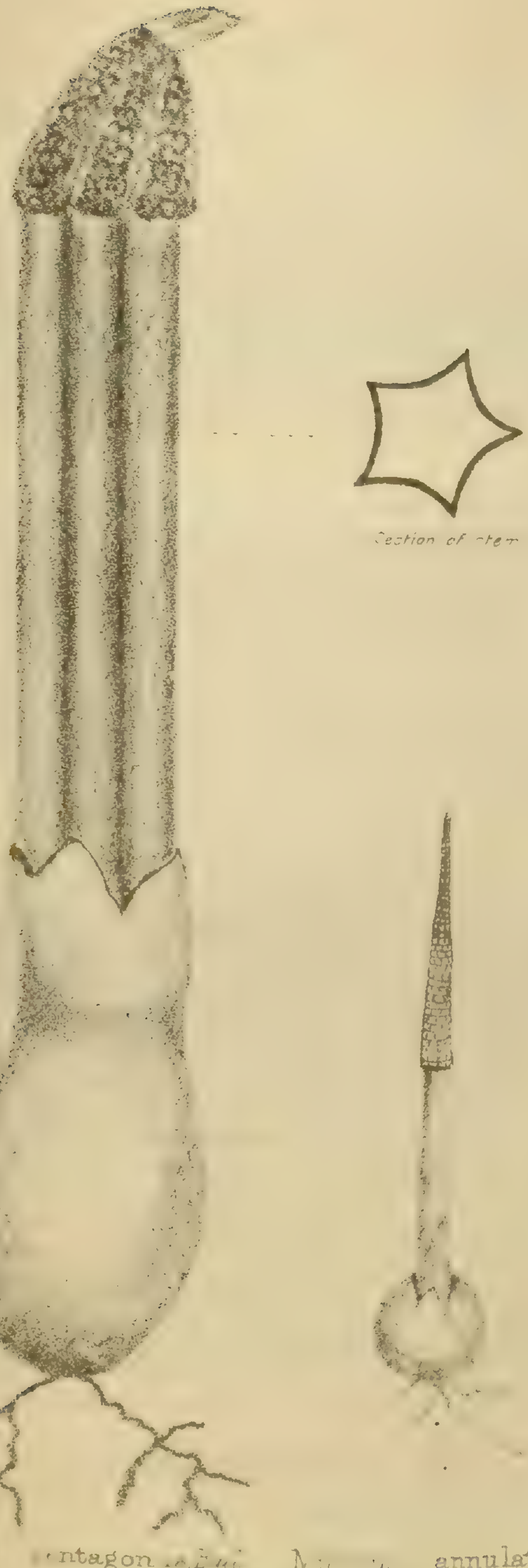
F. heterosporum, *Link.* Sporodochia orange, erumpent diffuent; conidia conglutinate, slender, curved, fusiform, very acute and pale-coloured.

Hab.: On ears of wheat from Herberton.

EPICOCCUM, Link.

E. micropus, *Corda.* Small-stemmed *Epicoccum.* Sporodochia gregarious, effuse, blackish; stroma subglobose, afterwards depressed, reddish-brown; basidia emergent, clavate, transversely septate, brown; conidia spherico-tetrahedrus, base depressed, sessile or very shortly pedicellate, glabrous, brown, impellucid, 22-23 μ diam.

Hab.: On the foliage of young oaks, Brisbane Gardens. In Europe and America this fungus is met with on decomposing vegetable matter.



Section of stem

Pentagonaster Eminens annulatus, Baily

ADDITIONS TO THE FLORA OF NEW GUINEA.

As may naturally be supposed, from being the nearest Government Botanist to New Guinea, I am frequently being called upon to determine plant specimens from there. It is my intention, therefore, in future to publish at the end of the Botany Bulletins the descriptions of all new species; also such notes upon the older ones as may be deemed advisable whenever plant specimens from that colony reach me.

SPECIMENS OF PLANTS COLLECTED BY MR. W. E. ARMIT, IN MARCH, 1894, ON MOUNT DAYMAN, N.E. COAST OF NEW GUINEA.

Besides the two new species now described, Mr. Armit's collection contained specimens of *Vitis cordata*, Wall.; *Potentilla anserina*, Linn.; *Uncaria appendiculata*, Benth.; *Moschosma polystachyum*, Benth.; *Hymenophyllum tunbridgense*, var. *exsertum*, Bail.; *Trichomanes parviflorum*, Poir.; *Lindsæa concinna*, J. Sm.; *Hypolepis tenuifolia*, Bernh.; *Polypodium serpens*, Forst.; and *Dawsonia superba*, Grev.

OLEARIA, Moench.

O. monticola (n. sp.) Branchlets clothed with a greyish or brownish tomentum. Leaves elliptical, 2 to 3 in. long, 1½ to 2 in. broad; on petioles of 4 or 5 lines, scattered, with minute gland-like distant-teeth along the margins, upper surface almost glabrous, underside densely tomentose. Flower-heads in dense pedunculate corymbs, in the upper axils often forming broad terminal panicles. Involucre 4 lines in diameter, the bracts linear, hairy, unequal. Rays of the female florets about 3 lines long, and 1 line broad, contracted towards each end, 3-toothed, the colour and number to each head could not be determined from the specimens sent, being so much broken. Disk florets with 5-narrow hairy lobes, anthers with minute somewhat blunt points at the base. Style-lobes rather long and curled in the ray-florets, shorter and not so spreading in the disk-florets. Achenes hairy. Pappus of about 20 nearly equal brownish bristles.

Hab.: Mount Dayman, N.E. coast of New Guinea. Collected by Wm. E. Armit, March, 1894. Probably the *Olearia* with elliptic leaves mentioned by Baron Mueller as occurring on the crest of the Owen Stanley Range is the nearest ally of the present species. *See* Trans. Roy. Soc. of Vic., vol. I., part II, page 10.

RHODODENDRON, Linn.

R. Armitii, *Bail.* (n. sp.) A dichotomously branched shrub with a whitish bark. Leaves scattered, but appearing whorled at the ends of the branches from their near proximity to each other, oval, coriaceous, 3 or 4 in. long, and about 2 in. wide, more or less covered on the underside with ferruginous scales which become silvery with age.

Petioles 3 to 6 lines long, stout, rough, with ferruginous scales, which latter are very dense upon the young shoots. Flowers about eight in a head or sessile umbel [white touched with sea-shell pink.—*Armit*]. Bracteal scales broad, covered with short hairs, but much broken in the specimens to hand, very deciduous; bracteoles narrow-linear, expanding at the extremities, longer than the pedicels, hairy. Pedicels about 1 in. long, clothed with similar scales to those upon the petioles. Calyx oblique, small, broad at the base, tapering to pointed teeth, with ciliate margins, becoming reflexed. Corolla-tube curved or nearly straight, about $2\frac{1}{2}$ in. long, scarcely exceeding 3 lines broad, slightly expanded under the limb, nearly glabrous outside, but hairy within, limb of five broad lobes, the fully expanded flower with a diameter of 2 in. Stamens 10, filaments clothed with short hairs in the lower half. Anthers oblong, about $2\frac{1}{2}$ lines long, exserted. Styles long as the stamens, ovary 5-celled, very hairy, like the lower portions of filaments and style; stigma peltate. Capsule not to hand. Amongst New Guinea species, the present seems nearest allied to *R. Carringtoniæ*, F. v. M.

Hab.: Mt. Dayman, N.E. coast of New Guinea, at an elevation of 8,900 ft. Collected by Wm. E. Armit, March, 1894.

VERNACULAR NAMES WITH THEIR BOTANICAL EQUIVALENTS.

(*Continued from pages 97 to 104 in Catalogue of the Indigenous and Naturalised Plants of Queensland.*)

ABILL—Aboriginal name at the Barron River for *Pygeum Turnerianum.*

BAGOOL—Aboriginal name at the Barron River for *Cryptocarya insignis.*

BALLY GUM—*Litsea reticulata.*

BAN-BAN—Aboriginal name at the Endeavour River for *Modecca australis.*

BARAGARA—Aboriginal name for *Alphitonia excelsa.*

BARROR—Aboriginal name at Rockhampton for *Careya australis.*

BISHOP'S WEED—An European name for *Ammi majus.*

BLACK CURRANT TREE, of Walsh River—*Antidesma Ghœsembilla.*

BOINJEN—Aboriginal name at the Barron River for *Acanthus ilicifolius.*

BOOBARCHOO—Aboriginal name for *Tristania suaveolens*, var. *glabrescens.*

BOOLERCHU—Aboriginal name for *Tristania suaveolens.*

BOONA (Bloodwood)—*Eucalyptus corymbosa.*

BOORAL—Aboriginal name at the Mitchell for *Persoonia falcata.*

BOREE—Aboriginal name for *Acacia homalophylla*, also *A. pendula.*

CAMPHOR-TREE, Queensland—*Cinnamomum Oliveri.*

CARROT-WOOD, of Eumundi—*Bursera australasica.*

CATTLE-BUSH, of Downs country—*Atalaya hemiglauca.*

COOBIABY—Aboriginal name on the Cloncurry for the Leichhardt-tree, *Sarcocephalus cordatus.*

COOHOY or CONKIE NUT—Aboriginal name at the Russell River for *Cryptocarya Palmerstonii.*

COOLIBAR (Gum-tree)—*Eucalyptus microtheca.*

COOTCHEE—Aboriginal name at Boulia for *Sporobolus actinocladus.*

CURRANT, of Fraser's Island—*Leptomeria acida.*

CURRUNGUL or TEAK—*Dissiliaria baloghioides.*

DAALGAAL—Aboriginal name at the Barron River for *Podocarpus elata.*

DANDELION, of Europe—*Taraxacum Dens-leonis.*

DEVIL'S or TIGER'S CLAW—A name given by some for the naturalised plant, *Martynia diandra.*

DIN-DIN—Aboriginal name at the Barron River for *Rhodamnia trinervia*, var. *spongiosa.*

DURANDOOL—Aboriginal name at the Barron River for *Loranthus dictyophlebus.*

ELEMI-TREE, of Queensland—*Canarium Muelleri.*

FRENCH BEAN FUNGUS—*Glœosporium Lindemuthianum.*

GALBRA—Aboriginal name at the Barron River for *Amorphophallus Galbra.*

GELLMERRA—Aboriginal name at the Barron River for *Cryptocarya australis.*

GIDYA—Aboriginal name at Charters Towers for *Acacia salicina*, var. *varians*; other parts, *A. homalophylla.*

GILLOWARA—Aboriginal name at the Barron River for *Cleistanthus Cunninghamii.*

GNORPIN—An aboriginal name for *Eucalyptus robusta.*

GOLD-SPANGLED-WOOD—*Cardwellia sublimis.*

GOORIGEN—Aboriginal name at the Barron River for *Lycopodium Clarœ.*

GO-ONJE—An aboriginal name on the Cloncurry for *Careya australis.*

GREEN-LIGHT FUNGUS—*Hiatula Wynniæ.*

GUIABA or GYABI—Aboriginal name at the Barron River for *Dioscorea transversa.*

GUNTHA-MARRAH—Aboriginal name on the Cloncurry for *Careya australis.*

JAMBOLLA—Aboriginal name at the Barron River for the inflorescence of *Amorphophallus Galbra.*

JIL-LEER, or Gutta-percha tree of Gulf country—*Excœcaria parvifolia.*

JINBUL—An aboriginal name for *Eucalyptus microtheca.*

KAVOR-KAVOR—Aboriginal name at Rockhampton for *Timonius Rumphii.*

KIMBARRA—An aboriginal name for *Eucalyptus robusta.*

KOOMBARRA—An aboriginal name for *Persoonia media.*

KURANDA—Aboriginal name at the Barron River for *Helmholtzia acorifolia.*

KURLEAH—An aboriginal name for *Eucalyptus microtheca.*

KURRA-GURRA—An aboriginal name for Scribbly Gum, *Eucalyptus hæmastoma.*

KUNKERBERRY—Aboriginal name on the Cloncurry for *Carissa ovata.*

LESSER CLOVER—*Trifolium procumbens* = *T. minus* of Eng. Bot.

MIDJIN-GOORA-NOORAN—Aboriginal name for *Myrtus tenuifolia.*

MAAPA—Aboriginal name at the Barron River for *Epipogum nutans.*

MALLBAN—Aboriginal name at the Barron River for *Aphananthe philippinensis.*

MARAGUIGI—Aboriginal name at the Barron River for *Cupania flagelliformis.*

MEDIC BURR—The European plant *Medicago denticulata.*

MEE-MEE—An aboriginal name for *Myoporum acuminatum.*

MILLGAR—Aboriginal name at the Barron River for *Wrightia Millgar.*

MINKIE—Aboriginal name at the Barron River for *Ophiorrhiza australiana.*

MOOIMOOI—Aboriginal name at the Barron River for *Lycopodium phlegmaria.*

MOGIORE—An aboriginal name on the Cloncurry for *Maba humilis.*

MOOTUKA—Aboriginal name at the Barron River for *Lucuma galactoxylon.*

MOORAY—Aboriginal name at the Barron River for *Pittosporum rubiginosum.*

MUNTEUPIN—An aboriginal name for *Petalostigma quadriloculare.*

MUNGARA—An aboriginal name for *Eucalyptus tereticornis.*

MUNGEROO—Aboriginal name at Boulia for *Cyperus esculentus.*

MURPE—Aboriginal name at the Russell River for *Melodinus Murpe.*

NANCHEE—Aboriginal name at the Mitchell River for *Persoonia falcata.*

OOLPANJE—Aboriginal name on the Mitchell River for the Leichhardt-tree, *Sarcocephalus cordatus.*

OOTCHO—Aboriginal name at the Mitchell River for *Careya australis.*

PEPPER GRAPE—*Vitis opaca.*

POISON-TREE, SCRUB—*Excœcaria Dallachyana.*

POMERA—An aboriginal name for the honeysuckle tree, *Banksia integrifolia.*

POODGEE POODGERA—An aboriginal name for *Mallotus philippinensis.*

RUSSELL RIVER GRASS—*Paspalum Galmarra.*

RUSTY GUM—*Angophora lanceolata.*

SALSIFY or SALSAFY, of Europe—*Tragopogon porrifolium.*

SAPISTAN or DOGSDUGS—*Cordia myxa.*

SATINWOOD, of Cairns—*Dysoxylon Pettigrewianum.*

SATINWOOD, of Eumundi—*Backhousia citriodora.*

SHOT-HOLE FUNGUS—*Phyllosticta circumscissa.*

SHUTTLE-COCK FLOWER—*Homalium circumpinnatum.*

SILKWOOD—*Cupania sericolignis.*

SWIZZLE STICK, of Rockhampton—*Timonius Rumphii.*

TALLOW-WOOD—*Eucalyptus microcorys.*

TANDEROO—An aboriginal name for *Eucalyptus siderophloia*

TCHEERGUN—An aboriginal name for Blackbutt, *Eucalyptus pilularis.*

TCHOONCHEE—An aboriginal name for *Avicennia officinalis.*

TEEWEEREE—Aboriginal name at the Barron River for *Tetracera Cowleyana.*

TEN-TEN—Aboriginal name at the Barron River for *Melastoma malabathricum.*

THANKOIN—An aboriginal name on the Cloncurry for *Maba humilis.*

THARR-GIBBERAH—Aboriginal name at Cloncurry for *Santalum lanceolatum.*

THURKOO—Aboriginal name at Cloncurry for *Clerodendron floribundum.*

TIGER'S or DEVIL'S CLAW—*Martynia diandra.*

TILL—Aboriginal name at Moreton Bay for *Endiandra sieberа.*

TOBACCO MOULD—*Peronospora hyoscyami.*

TOBACCO PIPE FUNGUS—*Cyphella longipes.*

TOBACCO PLANT, of Fraser's Island—*Hibiscus tiliaceus.*

TOI—An aboriginal name for Blackbutt, *Eucalyptus pilularis.*

TOKA—Aboriginal name at Rockhampton for the Leichhardt-tree, *Sarcocephalus cordatus.*

TOMATO-BLIGHT FUNGUS—*Macrosporium Tomato.*

TOOLOOKAR—A native name for *Angophora lanceolata.*

URARA—An aboriginal name for Spotted Gum, *Eucalyptus maculata.*

WAI-GEN—Aboriginal name at the Barron River for *Desmodium dependens.*

WHITLOW GRASS—An English name for species of *Draba.*

WITOOKA—Aboriginal name at Boulia for *Boerhaavia diffusa.*

WONGALI—Aboriginal name at the Barron River for *Chilocarpus australis.*

WONKARA—Aboriginal name at Port Curtis for *Eucalyptus tessellaris.*

YEDGENGEN—Aboriginal name at the Barron River for *Psychotria Dallachiana.*

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Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BOTANY BULLETIN No. XI.

JULY, 1895.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

BY AUTHORITY: EDMUND GREGORY, GOVERNMENT PRINTER, WILLIAM STREET

1895.

ERRATA IN BOTANY BULLETIN VI.

(Furnished by Professor E. Askenasy.)

Page 6, line 6-8 from top.—The sentence: "In discussing the algæ of this class," I., 10, *Syll. Alg.* refers to the *Chlorophyceæ* in general, and ought to stand at page 5 after Class II., *Chlorophyceæ.*

Page 6, line 24.—Instead of "cells favourable to them," read "scattered cells or indeterminate cells."

Page 7, line 21 from bottom.—Read "rarius" instead of "varius."

Page 8, line 20 from bottom.—Instead of "Both the investing cells, &c.," read "Both the investing cells grow larger towards the end, so that they touch each other, &c."

Page 9, line 8 from top.—Instead of "recontingunt" read "se contingunt."

Page 13, line 20 from top.—Instead of "Looked at from the constrictions," read "besides the constriction at the transverse walls."

Page 18, line 9 from top.—Instead of "*Web et Moebius*" read "*Web et Mohr.*"

Page 52, line 11 from top.—Instead of "*Coprosira*" read "*Capsosira.*"

Page 57.—*Compsopogon* belongs probably to the Florideæ, and would therefore find its place better after *Chantransia* at page 5.

PREFATORY NOTICE.

The present Bulletin is a continuation of Botany Bulletin No. VI., issued in January, 1893, and concerns the same order of plants. The determinations have all been made by my esteemed correspondents, the eminent specialists Professors Askenasy and Moebius, except in one or two cases of doubt, in which they referred to Professors Nordstedt and De Toni; and the material collected from different parts of the colony was forwarded to Professor Askenasy by myself. The descriptions are mostly derived from publications in German by the two first-mentioned gentlemen, and have been translated for me by my friend Mr. W. J. Byram, who is himself a worker in this order of plants. The illustrations of the freshwater forms are from the pencil of Professor Moebius, who kindly forwarded them for reproduction in the present Bulletin; whilst those of the saltwater forms are derived from photo-micrographs taken by Professor Askenasy. I have also, for the sake of comparison, in most cases added descriptions from the works of Cooke and Wolle, and wherever I have used these authorities it will be found that I have recorded my obligation to them. It must, however, be remembered that the descriptions of Professors Moebius and Askenasy are taken from the Queensland plants themselves, and are, therefore, for this colony always the most reliable.

I cannot allow this opportunity to pass without expressing my very deep sense of the courtesy and kindness displayed by Professors Moebius and Askenasy in undertaking these investigations, and my thanks for the trouble and time which they have expended in supplying descriptions and illustrations. I have also to express the hope that the study of microscopy in this colony will be materially advanced by this valuable accession to our knowledge of its Algæ, and that not only may a delightful pursuit be provided for lovers of the beautiful, but that important additions may be made to biological science.

F. M. B.

July, 1895.

BOTANY:
CONTRIBUTIONS TO QUEENSLAND FLORA.

QUEENSLAND FRESHWATER ALGÆ.

BATRACHOSPERMUM, Roth.

B. Dillenii (*Bory.*), *Sirdt.* Dr. M. C. Cooke, in British Freshwater Algæ, 293, places this as a variety of *B. atrum*, Harv., with the following description:—Filaments dark-brown, very thin, lower nodes remote, the interstices beset very densely with prominent cells, upper nodes crowded, branchlets very short, consisting of 3 to 4 cellules, extreme apical nodes confluent. Size: Cellules, ·012 mm. diam.

Prof. Moebius says:—"The specimens collected are 3-4 cm. long, and richly branched, covered partly with antheridia, partly with cystocarps. The species belongs to Sirodot's group of the Setaceæ, and is known, as far as I see, in Australia, England, and France. It does not appear to have been yet found in Germany. Sirodot (Les Batrachospermes, Paris 1884, p. 253 *et. seq.*) describes it in the following manner:—'Sexual form: diœcious. The distinctions that can be detected between the vegetative organs of the male and female specimens have so small a significance, and are moreover so faint that it is not worth while to describe the male and female plants separately. The colour is olive-green, blackish in old age, especially in the female plants in fructification, brown to blackish-green under a stronger illumination; after drying, the tint becomes darker. The shape is bushy; the branches of the first rank are as strongly developed as the main axis. The size is very various; as a general rule the plants of springs are larger than those of brooks. The size fluctuates between 2 and 12-13 cm. The branching is extraordinarily rich; the male plants are generally more slender; the inferior whorls often produce 2, 3, and 4 branches; the last branchlets approach each other, stand a shorter or longer distance apart, and are extended into a long thread-like projection. The young branches are curved inwards. The whorls are rudimentary; the length of the internodes is mostly proportional to that of the whole plants, therefore they are shorter in the small and longer in the large specimens, and, all other conditions being equal, are clearly prolonged in the female plants; in the middle and inferior portions of the branches the internodes are slightly drawn in, and enlarge in thickness downwards to the whorl lying beneath them; the longer they are the more clearly they display this form. The primary whorl-branches consist of one short, broad, often egg-shaped basal-cell, which at the vertex, and laterally from the vertex, bears 3 or usually 4 secondary whorl-branches, all equal in the female plants,

when they have reached the same stage of growth; in the male plants, on the other hand, they are lateral, when they carry antheridia, somewhat coiled. The secondary whorl-sprays are slightly developed, and form only several branches; the longest branches consist only of 4, or at the most of 5, cylindrical cells, which are hardly twice as long as broad. The terminal cells bear hairs abundantly; they are proportionately long, cylindrical, or at the base slightly conical.

"'The cortical filaments lie close to the central row of cells, and cover it with an envelope which becomes gradually and constantly thicker to the whorl beneath. They also surround the latter while they seek for themselves a way by which they can grow over it. The interverticillate filaments are always found numerous and compact under a whorl, more or less abundantly also upon the underhalf of the internodes; at first one—or two—celled, they lengthen when they are overgrown by new layers of cortical filaments; they often bear hairs; when in the male plants they bear antheridia their ends are coiled. The inferior ramuli serve as shoots of prolification in persisting plants. The formation of gelatinous substance is not so marked that the specimens remain in the dry state adhering to the paper. The antheridia-bearing branches stand on the whorls and on the internodes. The female branches spring for the most part from the basal-cell of the primary whorl-branch in the form of a branch bent backward and curved inwards; sometimes also they originate from the ramuli of a secondary whorl-branch, or proceed from an interverticillate branch. The trichogyne is club-shaped, sometimes flask-shaped. The cystocarps appear in the form of wart-shaped elevations on the whorls, very seldom on the internodes. The bracteal filaments are very short, and disappear amongst the cystocarps.' Sirodot, with doubt, assumes the *Chantransia chalybea* to be the non-sexual form. I myself have not observed the *Chantransia* belonging to it. He shows the prothallium as excessively small. The plant occurs, according to him, in streams, brooks, ponds, and wells in different parts of France. Their time of fructification is, in that country, the spring. In Australia richly fructifying specimens, as indicated above, were collected in July.

"While, therefore, I let the description given by Sirodot for the French form of this alga pass also for the Australian form observed by me, I have only to add that in the latter the interverticillate branchlets were a little less abundantly developed than in the former, and less abundantly than in other Australian specimens, which were collected by French in Carolinia Creek, and accessible to me through the kindness of Dr. Nordstedt. I confine myself, therefore, to making some further remarks on the illustrations.

"Fig. 1. shows one of the upper branches with its ramuli on the top of which the apical cells may be everywhere perceived. The length of the internodes is a varying one. The cortex is yet thin on the upper portions; the interverticillate ramuli are scanty and short.

"Fig. 2. Portion of a very young branch, in which the nodes of the axis have as yet extended very little, and the cortical filaments and secondary whorl-branchlets are beginning to sprout from the primary cells of the whorl-branch.

"Fig. 3. A branch with three developed cystocarps, which can be perceived on the plant as small swellings of the axis, even with the naked eye. On the under portion of the main axis the cortex is thicker, and the interverticillate ramuli stand out more clearly.

"Fig. 4. The youngest state of a procarp which I could find; the flask-shape trichogyne forms the end of a branch consisting of a row of cells. The cells of this branch have already partly put forth shoots. The sterile branchlets on the relative axis are only partly delineated with it.

"Fig. 5. A female branch (inflated by the mature cells) proceeds from the primary whorl-cell, and is itself furnished with abundant side-shoots. The trichogyne is distinguished by its thicker walls, and by its contents being drawn together; perhaps the trichogyne has remained unfertilised and so died. Upon the trichogyne is seen a whorl-branch which bears a hair.

"Fig. 6. Trichogyne of a somewhat older part of the plant considerably elongated and constricted again in the upper part. In this form I have seen many trichogyne. In these also the membrane looks as if the top would lift up from the under portion. Whether, perhaps, this is only an appearance of the trichogyne remaining unfertilised I cannot say, since I have sought in vain for trichogyne with clearly adhering spermatia. On one node many procarps are formed, yet it seems that only sometimes the discharge of a cystocarp takes place, which then covers almost the whole node, whose spore-bearing threads, however, radiate from a common middle point.

"Fig. 7. Some cells from a complex of antheridia with ripe and partly emptied antheridia; before it an expelled spermatozoid."

Hab.: Charley's Gully, Lower Freestone Creek, Warwick, in slowly flowing water, ***Frank Pigram.***

(Plate I., Fig. 1-7.)

CHANTRANSIA, Fries.

C. pygmæa, *Kuetz.* Tufts rounded, about a line in diameter, dingy greenish, becoming reddish, violet, or steel-blue when dry; threads proceeding from a common centre, branched upwards in a somewhat fasciculate manner, branches erect, parallel, rather adpressed; joints 2-3 times as long as broad, apical joints obtuse; fascicles lateral or terminal. Size: Cells, ·011-·014 mm. diam.—Cooke's British Freshwater Algæ, 285.

Prof. Moebius makes the following remarks:—"In small tufts, 1-2 mm. high, on a root fibre. From the creeping filaments rise upright branches, which give off thickly pencil-shaped sprays towards the top. The branches bend round at the base upwards, and then proceed in a straight line; in the purely vegetative filaments the branches terminate at about an equal height. The cells are cylindrical, somewhat constricted at the ends, 10-14 μ thick and $1\frac{1}{2}$-3 times as long. The terminal cells form no hairs, but end with a blunt point. As sporangia the terminal cells seem to develop pretty regularly from three-celled branchlets. From the lower cells of the upright filaments spring at intervals short rhizoids, which I have not observed in the creeping filaments. Known from Europe and North America."

Hab.: Freestone Creek, Warwick, in flowing water, July, 1893, *Frank Pigram.*

(Plate II., Fig. 1-4.)

C. subtilis, *Moelius*, n. sp. This being a new species, Prof. Moebius first gives the following Latin description:—"Ch. thallo subtili e filis procumbentibus, rhizoideis instructis et filis raris adscendentibus constituto; cellulis filorum procumbentium 10 μ crassis, ad genicula constrictis, filorum adscendentium 6-10 μ crassis, cylindricis; ramis in una planitie alternantibus vel oppositis, majoribus paucis, in trichoma exeuntibus, minoribus pluribus cellula ultima in sporanguim mutata; sporangiis etiam lateralibus prope terminalia vel prope trichomatum basim sitis.

Ch. thallus slender, formed of creeping filaments which are furnished with rhizoids and scanty upright filaments; cells of the creeping filaments 10 μ thick, constricted at the septa; cells of the upright filaments 6-10 μ thick, cylindrical; branches in one plane, alternate or opposed; the larger few in number prolonged into a trichome; the small more numerous with the terminal cell converted into a sporangium; sporangia also lateral placed near the ends or near the base of the trichomes.

These plants, which I can identify with none of the known species, I found only in isolated specimens on a *Nitella*, whose branches serve as a substratum for the creeping filaments. The cells of the creeping filaments are about 10 μ thick and nearly 5 times as long, clearly constricted at the septa; they form here and there short projections resembling root-hairs. The creeping filaments form only scanty and slightly branched upright branches. These consist of long cylindrical cells 6-10 μ thick, which are scarcely constricted at the septa, at least on the upper part of the branches. The branches are placed alternately or opposed in one plane; the longer branches, of which only a few are formed, are prolonged like the main branch into a long hair. Short side branches are more abundantly given off, often only formed of 2 cells, the upper cell of which then becomes a sporangium. Besides the terminal sporangium one may also be formed laterally, or one on every side; and the sporangia may also be developed laterally at the basis of a hair.

Hab.: Burpengary, Queensland, *Dr. Thos. L. Bancroft.*
(Plate II., Fig. 5-6.)

COLEOCHÆTE, Bréb.

C. divergens, *Pringsh.*, **var. minor,** *Hansg.* Vegetative cells 14-17 μ thick, 1-1½ times as long. Diameter of the ripe corticated oosporangium, 75 μ. The dimensions are, therefore, smaller than those assigned to the typical species, and I consequently class the Australian alga with the variation *Minor*, Hansg., with which it agrees better in size. It has hitherto been only known for certain to occur in Europe.—Note of *Professor Moebius.*

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*

C. orbicularis, *Pringsh.* Vegetative cells 7-10 μ thick; oogonia 33, 45 μ. The dimensions agree with those of the specimens found by me at Heidelberg. Known to occur in Europe, Siberia, North America, Hawaii, Russia.—*Moebius.*

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*

Compare the above with the description given in Botany Bulletin No. VI., p. 9, and Plate II., Fig. 5, thereto appended.

C. scutata, *Bréb.*, **f. minor**, *Moebius n.f.* Vegetative cells 14-22 μ. Diameter of the ripe oogonia 60-62 μ. The size of the oogonia here given is constant in several specimens; it is, however, only half of that in the recognised diagnoses, according to which the oospores should be 140-160 μ long and 120 μ broad. The vegetative cells are almost twice as large in the typical form—viz., 28-45 μ thick, and 1-3 times as long; whereas in specimens which I have found at Heidelberg they are also only 10-20 μ broad.

This alga has already been assigned by me to Australia, but only in the sterile condition (*see* Botany Bulletin No. VI., page 9).—*Moebius.*

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*

An interesting description of this alga, suitable for students, will be found in Bower's Practical Botany, 3rd edition, p. 419. Reference may also be made to Wolle's Freshwater Algæ of the United States, p. 64, and to Plate LXXII., Fig. 8-13, appended to that work. The alga is also figured in Plate III. of Botany Bulletin No. VI.; the latter figures being copied from Cooke's British Freshwater Algæ, p. 196.

C. irregularis, *Pringsh.* Thallus bright-green, filaments irregularly disposed—not parenchymatous and not with any system of order; articulations longer or more frequently shorter than the diameter. Oogonia transversely broadly oval, usually at the ends of branchlets, nude. Filaments 15-20 μ wide. Oogonia diameter 40-50 μ.—*Wolle*, Freshwater Algæ of U.S. America, 65.

Prof. Moebius gives the following note:—"Upon the cells of *Nitella*, by which many of the Coleochæte are wholly covered as by a cortex. I have not observed sexual organs in this alga. The cells emptied of their contents are at any rate zoosporangia. The cells are 13-20 μ thick, as in the specimens from Hawaii (12-20, 12-14, according to Nordstedt); otherwise the size given is about 25 μ, as in the specimens observed in Europe and North America."

Hab.: Burpengary, March, 1893, *Dr. Thos. L. Bancroft.*

BULBOCHÆTE, Ag.

B. setigera (*Roth*), *Ag.* Oogonia depressedly somewhat quadrangularly globose, seated beneath terminal setæ or beneath androsporangia; membrane of the oogonium after fertilisation thickened: dissepiment of supporting cell a little above the middle or at the middle; epispore granulated; androsporangia scattered or epigynous, bicellular; dwarf-males seated upon or about the oogonia; stem straight. Size: Cells, ·025-·028 mm., 2½-5 times as long; androspore cell, ·018-·02 x ·014-·018 mm.; oogonia, ·075-·08 x ·06-·065 mm.; dwarf-males, ·012-.013 x ·034-·036 mm.—Cooke's British Freshwater Algæ, 175.

Prof. Moebius says:—"The alga now before us may perhaps also be treated as a variety of *B. setigera*, with which, at all events, it shows great affinity. It is of low growth, only about 1 cm. high, and in this respect, as in the size of its cells, so resembles *B. gigantea*, in conjunction with which it occurs, that at first sight it may be easily confounded with the latter. The vegetative cells are 20 μ thick and 3-4 times as long, furnished with a thick yet smooth membrane, while I found in preserved material of *B. setigera* the membrane finely dotted. The oogonia never form the end of a longer branch, but only of a short side branch; they have a compressed spherical

shape, are 60-63 μ broad and 56-58 μ high, and are completely filled with the ripe oospore. The latter has a thick, compact granulated membrane, as is specified in the case of the episporium of *B. setigera*; upon the side turned towards the stem the membrane of the oospore is thinned at one spot. The supporting cell is divided by a dissepiment into a large (in transverse section) right-angled inferior cell and a small (in transverse section) pentagonal cell above; the dissepiment lies, therefore, very high up. I have never found androsporangia in the specimens bearing the oogonia, but only upon particular plants; they are bicellular, and lie at the end of a branch under a bristle. The dwarf males are seated upon the support cell, or other scattered vegetative cells of the female plant, never upon the oogonia themselves. They are exactly 10-14 μ thick, 34 μ long. The stem is shorter than the 1-2 celled antheridium. If we compare the differences of the foregoing alga with the usual *B. setigera*, we find the Australian form lower, vegetative cells of the latter 20 μ, of the former 25-28 μ thick, the Australian with smooth, the usual with finely dotted membrane; (which is not mentioned in the diagnosis), the androsporangia of the Australian form upon particular plants, in the ordinary form in the same plants as the oogonia; the partition wall in the Australian form always entirely in the upper part of the support-cell; in the other in the middle of the support-cell, or somewhat higher; the dwarf males in the Australian form never seated upon the oogonia, in the other seated upon the oogonia or in their vicinity. I do not believe that these differences can be treated as specific; it will be seen that the representation of the Australian form is very like that of the usual *B. setigera*. The latter is known to occur in Europe, North America, Algiers and New Zealand."

Hab.: Glasshouse Mountains, Sept., 1892.

(Plate III., Fig. 7-9.)

B. gigantea, *Pringsh.* Cooke's British Freshwater Algæ, 175. Idio-androsporous? Oogonia rather depressed obcordate-globose, seated beneath terminal setæ, rarely beneath vegetative cells; dissepiment of supporting cell at or a little above the middle; epispore verrucose; dwarf males a little longer than the oogonia, and seated upon it; stem twice as long as the spermogonium, arcuate. Size: Cells, ·024-·027 mm. x 2-3 times as long; oogonia, ·062-·066 x ·051-·058 mm.; stem of dwarf males, ·011-·012 x ·04-·045 mm.; sperm. cell, ·013-·014 x ·02-·022 mm.—*Cooke l.c.*

Prof. Moebius remarks:—"The whole plant is 3-7 mm. high. The membrane of the vegetative cells is clearly dotted. These dots are fine pores, which in optical section of the membrane are perceived as lines running through it. The outer mouth of the pore seems, however, also to resemble a small wart-shaped swelling of the membrane outwards, which seen from the surface appears as glistening dots. The oogonia form short side-branches, or the ends of longer branches, and carry above them usually only a bristle, more rarely a sporangium. In this case also I have always found the androsporangia upon different plants. They do not seem to have been observed before, since Pringsheim remarks with regard to this species—'Mother-cells of the androspores upon different branches,'" and De Toni in the diagnosis (Sylloge Algarum I., p. 22) sets a query against idio-androsporous, which, therefore, may well be dismissed for the

present. The androsporangia are 1 to 3-celled, and lie like the oogonia under a bristle or under a sporangium. The dwarf-males are sometimes seated in great numbers upon the oogonia, so that they completely envelope it. For the rest the alga shows the characteristics of *B. gigantea*, recognised in earlier descriptions and illustrations. The dimensions are as follow:—Vegetative cells, 21-24 μ thick, 3-4 times as long; the oogonia, 50 μ high, 64 μ broad, completely filled by the oospore which is furnished with verrucose epispore.

Known to occur in Europe, North America, New Zealand.

Hab.: Glasshouse Mountains, *Dr. Thos. L. Bancroft.*
(Plate III., Fig. 1-6.)

B. elatior, *Pringsh.* Prof. Moebius gives the following note:—"In collection at Burpengary, November, 1892. In my earlier communication I have already described this alga; on this occasion it was also again found in fructification."

Hab.: Burpengary, *Dr. Thos. L. Bancroft.*

B. pygmæa (*Pringsh.*), *Wittr.* Cooke's British Freshwater Agæ, 176. Oogonia ellipsoid, patent, seated beneath terminal setœ, or vegetation cells, in longitudinal section rather quadrangular; androsporangia scattered, dwarf males seated about the oogonia. (Filaments at first short and curved.) Size: Cells, ·012-·015 mm. x a third part shorter or equal; oogonia, ·023-·025 x ·034-·04 mm.; stem of dwarf males, ·011-·012 x ·015-·018 mm.; sperm. cell, ·007-·0075 x ·007-·0075 mm.—*Cooke l.c.*

Prof. Moebius says:—"The sexual organs of this alga have not been observed by me, and this species is therefore only determined according to the characteristic appearance of the vegetative cells. These are 13-17 μ thick and somewhat shorter, or as long as thick (according to the diagnosis 12-15 μ). The emptied cells are at all events such as have discharged zoospores."

This species is known to occur in Europe, Afghanistan, and North America, and in Europe is in fruit from July to September.

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*
(Plate III., Fig. 10.)

ŒDOGONIUM, Link.

Œ. fragile, *Wittr.* Oogonia single or twin, globose or subegg-shaped-globose, opening by pore above the middle; oospore fills the oogonium; spermogonia 1-3 celled, hypogynous or subepigynous; spermatozoids twin. Diameter of veg. cell., 12-17 μ; 4-5 times longer. Diameter of oogon., 42-47 μ x 44-50 μ. Diameter of oospor., 40-44 μ x 39-44 μ. Diameter of sperm. cell, 12-15 μ x 10-12 μ.—*Wolle*, Freshwater Algæ of U.S. Amer., 71.

The following is Prof. Moebius' description:—"Vegetative cells 11-16 μ thick, 3-6 times as long. Monœcious. Oogonium spherical, wholly filled by the oospore, about 30 μ thick. Antheridia consisting of 1-3 cells with antherozoids lying two and two upon each other. The dimensions are somewhat smaller than those specified in the diagnosis, according to which the vegetative cells are 12-17 μ, the oogonia 42-47 : 44-50 μ in size."

The species is known to occur in Sweden and North America.

Hab.: Myrtle, near Brisbane; in brackish water, November, 1892, *Dr. Thos. L. Bancroft.*

Œ. nodulosum, *Wittr.* Prof. Moebius gives the following remarks:—"Although only sterile filaments were seen, I nevertheless believe that I can determine the species pretty certainly by comparison with the illustration in Wittrock's Prodomus Mongr. Oedog., Fig. 2. The cells, moreover, show at the upper end and in the middle a circular protuberance; but in all the cells this is only formed from the inner layer of membrane, while the outer is a smooth cylinder. The illustration shows these features better than a description. I refer, however, particularly to it, because I had also observed something resembling it in *Œ. undulatum*, which I have also remarked in my earlier communication. The cells are 20-25 μ thick and 2-3 times as long (according to the diagnosis the cells are 23-29 μ thick). This species, which is monœcious, was first found in Sweden, but does not yet seem to be known to occur in other places."

Hab.: Dalby, Darling Downs; in collection, May, 1893, *Dr. Thos. L. Bancroft.*
(Plate IV., Fig. 8.)

Œ. longicolle, var. senegalensis, *Nordst.* The following is Prof. Moebius' description:—"Vegetative cells 4-5 μ thick, about 5 times as long; oogonia 18 μ broad. I have not seen the dwarf-males. Nordstedt has only once observed them in the typical form (from the Sandwich Islands), and in the above-mentioned variety not at all. Schaarschmidt makes no mention of the dwarf-males for the *forma afghanica* designated by him; they are, perhaps, quickly perishable."

Hab.: Swamp near Burpengary, March, 1893, *Dr. Thos. L. Bancroft.*
(Plate IV., Fig. 5.)

Œ. undulatum (*Bréb.*), *A. Br.* Prof. Moebius says:—"This species was found by me in Australia only sterile; now, however, I have also observed the sexual organs, oogonia and androsporangia in the same filaments. The oogonia lie here and there two and two behind each other, and are not filled up by the spherical oospore with thick stratified membrane (60 μ in diameter). The androsporangia are three to five-celled. The dwarf-males are generally seated upon the support-cells; I found them, however, also upon a sterile cell under the antheridium. They are 8-9 μ thick, and 50-55 μ long. It is generally stated that they are unicellular, but, according to my observation, the antheridium is clearly separated from the basal-cell by a septum; and I may remark in this connection that the drawing which Wolle gives in his Freshwater Algæ of the United States also makes a distinction between basal-cell and antheridium, while in the text, following the statements of an earlier author, he refers to the dwarf-males as unicellular. Wittrock has certainly classed this species with those with unicellular dwarf-males, without giving any illustration of them; then de Bary, who assigns to Œdogonium the species earlier distinguished as *Cymatonema undulatum*, has not observed the organs of fructification; Rabenhorst also seems only to know sterile specimens. It seems to me, therefore, that the statement of the unicellular condition of the dwarf-males in *Œ. undulatum* depends upon an error; since I do not believe that in the same species unicellular and bicellular dwarf-males occur together."

Hab.: Dalby, Darling Downs, *Dr. Thos. L. Bancroft.*
(Plate IV., Fig. 1-1a.)

Œ. crassiusculum, *Wittr.* Cooke's British Freshwater Algæ 162. Gynandrosporous. Oogonia single or twin, globose, egg-shaped or nearly globose, opening by a pore above the middle; oospores ellipsoid-globose or globose; membrane very thick, almost filling the oogonia; androsporangia 2-5 celled; dwarf males nearly straight, seated on or about the supporting cells; spermogonia 1 (?) celled. Size: ·027-·03 mm., 3½-5 times as long; oogonia, ·054-·06 x ·06-·075 mm.; oospore, ·051-·057 x ·052-·063 mm.; androsp. cells, ·026-·028 x ·01-·018 mm.; sperm. cell, ·007-·009 mm.—*Cooke l.c.*

The following is Prof. Moebius' description:—"Vegetative cells 35μ thick, about 3 times as long; oogonia single, elliptical-spherical, 52 μ thick, 60 μ long, not wholly filled by the oospores; dwarf-males on the support-cell, slightly curved beneath, 13 μ thick, 75 μ long, with 1 to 2 celled antheridium."

Known to occur in Europe and North America.

Hab.: Dalby, Darling Downs; collection, May, 1893, *Dr. Thos. L. Bancroft.* (Plate IV., Fig. 2.)

Œ. echinospermum, *Al. Br.* Cooke's British Freshwater Algæ, 164. Gynandrosporous, or idiandrosporous. Oogonia single, ellipsoid-globose, or nearly globose, opening by a pore at the middle; oospore almost filling the oogonia, globose, echinulate; spines awl-shaped; androsporangia 2-5 celled, dwarf males a little curved, seated on the supporting cells; spermagonia unicellular. Size: Cells, ·018-·03 mm., 2½-4½ times as long; oogonia, ·04-·05 x ·042-·057 mm.; oospore, ·038-·047 x ·038-·049 mm.; spine, ·003 mm. long; androsp. cell, ·021-·025 x ·009-·015 mm.; sperm. cell, ·01-·012 x ·012-·015 mm. —*Cooke l.c.*

Prof. Moebius says:—"The appearance of the specimens observed corresponds to the illustrations and description of this species, but the dimensions found are somewhat larger than those assigned. Vegetative cell 37 μ thick, about 3 times as long. Oogonium spherical, about 60 μ thick. Diameter of the oospore without spines 50 μ. Dwarf-males seated upon the support-cells, 83 μ long, with unicellular antheridium. I found, moreover, only one filament with two oogonia; in one of them the oospore was unripe and seemed to be surrounded with epiplasm, from which the spines are probably formed; in the other the oospore was ripe and coloured yellow."

Known to occur in Europe and North America.

Hab.: Dalby, Darling Downs, May, 1893, *Dr. Thos. L. Bancroft.* (Plate IV., Fig. 3.)

Œ. Franklinianum, *Wittr.*? Diœcious, mucandrous; oogonia single or rarely twin, sub-globose, opening by a pore above the middle; oospore globose, filling the oogonium, membrane firm; filaments of male plant slightly smaller than the female. Diameter veg. cells, fem., 9-12 μ, 3-6 times longer; diameter veg. cells, mas., 8-9 μ, 3-5 times longer; diameter, oogon., 26-31 μ x 29-41 μ; diameter oospore, 25-29 μ x 24-30 μ; diameter sperm. cells, 8-9 μ x 5-7 μ.—*Wolle,* Freshwater Algæ of U.S. America, 89.

Prof. Moebius says:—"The filaments with oogonia, which were found pretty abundantly, show somewhat larger dimensions than are assigned to the species, so that the determination does not appear to be quite certain. Vegetative cells 14-17 μ thick, 3-5 times as long;

oogonia single, but several in the same filament not far distant from one another, approximately spherical, 38 μ long, 43 μ broad, with a pore in the upper part frequently coloured brownish-black, usually wholly, more rarely not filled with the oospore; antheridia usually 3-celled, with two antherozoids, one lying over the other in every cell; male filaments somewhat thinner than the female."

Hitherto known to occur in North America.

Hab.: Burpengary Swamp, March, 1893, *Dr. Thos. L. Bancroft.*
(Plate IV., Figs. 9, *a*, *b*.)

Œ. cardiacum (*Hass.*), *Kuetz.* Cooke's British Freshwater Algæ, 166. Oogonia single, between heart-shaped and globose, opening by a pore a little above the middle; oospores globose, not filling the oogonia; male plants a little slenderer than the female; spermogonia. 2-10 celled; spermatozoids binate, terminal cells obtuse. Size: Cells, fem, ·018-·03 mm., 2-7 times as long; cells, male, ·015-·025 mm., 2-6 times as long; oogonia, ·05-·07 x ·058-·086 mm.; oospore, ·042-·06 x ·042-·06 mm.; sperm. cell, ·015-·021 x ·01-·013 mm.—*Cooke l.c.*

The following is Professor Moebius' description:—"Vegetative cells, 25-30 μ thick, 5-7 times as long. Oogonia, elliptical-spherical, 65-84 μ. Oospore not entirely filling up the oogonium, 63:73 μ. Antheridia in particular filaments consisting of 8-10, up to as many as 30 cells, with 2 antherozoids lying beside each other in every cell. According to the diagnosis the antheridia in this species consist of only 2-10 cells; since, however, the description and the dimensions tally in other respects, I think that I can class the alga with this species, although an antheridium consists of a larger number of cells than usual."

Œ. cardiacum is known to occur in Europe and North America.

Hab.: Dalby, Darling Downs, May, 1893, *Dr. Thos. L. Bancroft.*
(Plate IV., Fig. 10.)

Œ. grande, *Kuetz.* Cooke's British Freshwater Algæ, 172. Oogonia oval-elliptic, nearly twice as long as broad; oospores oval-elliptic, entirely filling the oogonia; basal-cell contracted towards the base, then dilated and discoid; terminal cell obtuse. Size: Cells, ·025-·035 mm., 3-4 or 5 times as long; oogonia, ·1 x ·07 mm.; oospore, ·09 x ·065 mm.— *Cooke l.c.*

Prof. Moebius says:—"I have observed only single female filaments which seem to me to belong to this species. I have not seen male filaments, and these (according to Hansgirg) must be as yet altogether unknown. The vegetative cells are 34 μ thick, 4-5 times as long; the oogonia single, egg-shaped, 60-66 μ thick, 84-90 μ long, almost filled up by the egg-shaped oospore."

Hab.: Dalby, Darling Downs; collection, May, 1893, *Dr. Thos. L. Bancroft.*
(Plate IV., Fig. 6.)

Œ. pachydermatosporum, *Nordst.* Prof. Moebius remarks:—"I have observed filaments with oogonia and ripe oospores in abundance; but on tbis occasion also no male filaments, only single filaments with shorter cells amongst the others. I have already noticed the species in my earlier pamphlet."

Hab.: Burpengary, November, 1892, *Dr. Thos. L. Bancroft.*
(Plate IV., Fig. 7.)

Œ. (species). Prof. Moebius says:—"Of other *Œdogonia* which I could not determine, I shall only notice one species found sterile on account of the peculiar form of its vegetative cells. The longitudinal walls are in this case slightly undulating in a different way from those of *Œ. undulatum*, while in every cell are present 4 sharper and between them 3 shallower constrictions."

Hab.: Burpengary; collection, November, 1892, *Dr. Thos. L. Bancroft.* (Plate IV., Fig. 4.)

HORMOSPORA, Bréb.

Thallus tubular, gelatinous, swimming free. Cells oblong or oval, green, arranged in simple longitudinal series (families), either remote from each other or more or less united at the poles. Tegument thick, confluent, contained within the broad gelatinous tube, which is either simple or branched.—Cooke's British Freshwater Algæ, 21.

H. transversalis, *Bréb.* Cooke's British Freshwater Algæ, 22. Tubes slimy, equal, or undulate; cells ovate-oblong or fusiform, disposed transversely in a moniliform series; contents granular. Size: Diameter of tube, ·075-·12 mm.—*Cooke l.c.*

Prof. Moebius says:—"The peculiar alga, which I shall here describe, may best be inserted in the genus *Hormospora*, and displays an unmistakable resemblance to *H. transversalis*, Bréb., so that the diagnosis which the author gives for this species (Annalesdes Sciences Naturelles III., Sér. Botanique, T.I. pag., Pl. 1, Fig. 2) agrees with it in all respects: 'Filamentis simplicibus, mucosis, æqualibus aut undulatis, corpusculis ovoideis elongatis v. fusiformibus, saepius quaternatis, in seriem moniliformem transverse dispositis; endochroma granulosum.' It is distinguished from the latter in this respect that the filaments are much thinner, and the cells display peculiar incrassations of the membrane, which are not mentioned in the diagnosis. *H. transversalis* does not seem to have been again observed and described by later authors (De Toni's Sylloge Algarum omits it), so that I cannot distinguish whether those incrassations of the membrane do not occur in the species treated of by Brébisson or have been merely overlooked. Of the alga in question I observed single free-swimming filaments amongst other algæ. The filaments are 20-25 μ thick, and consist of a row of cells in a thick gelatinous envelope. The cells have (seen from the side) an elliptical form, and lie with their longitudinal axis perpendicular to the longitudinal direction of the filament; seen from above, they are almost circular; their diameter amounts to 8-11 μ. At certain distances—viz., always between every four cells—appears a differentiation in the gelatinous substance of the filament, whilst here the outer contour of the gelatinous substance forms a small bend outwards; the piece extending from the bend is limited by two transverse lines, which pass directly through the longitudinal axis of both the neighbouring cells; of these lines one appertains to the one, and the other to the other group of every four cells. The whole contour of the filament thereby constitutes a somewhat undulatory course, but not so irregular as in Brébisson's *H. transversalis*. The contents of the cells cannot be very precisely discerned, but form a coherent mass filling up the greater part of the lumen in which iodine gives a reaction of starch.

"The membrane of the single cell is clearly marked with a double figure, and rises from the common gelatinous envelope; above and below it is drawn out into a small point. In the process of cell-division the partition wall is gradually formed from without inwards, and as soon as the contents have separated into two portions, the beginning of the new membrane is seen as two prominences above and below, directly under the outer pointed prolongations. When the partition wall is formed it divides, and the two new cells move from each other (by gelatination of the intermediate lamella); sometimes, also, the cells are seen still adhering in the middle, whilst at the edges they are already forced somewhat away from each other; the gelatination of the intermediate membrane begins, therefore, in this case at the edges. Soon after division the newly-formed cells have a shape differing somewhat from the mother-cell; for upon the side of the new membrane they are flat and on the other side arched—the points are bent towards the flat sides. At first the corresponding side of the partition wall of the new cell also by degrees arches itself outwards, and the points thereby come to lie in the middle-line of the now elliptical-egg-shaped cell and to be straight; then the process of subdivision may again ensue. Besides these transverse subdivisions I also observed in one piece of filament (which, however, seemed to be breaking up) divisions of the cells in the longitudinal direction of the filaments, so that two cells then lay one over the other. Moreover, occasionally a smaller piece is separated from a cell, which then comes to lie on the outside of the row. The formation of special organs of propagation was not observed, although this is not the case in the other species of *Hormospora;* in the present instance the filaments, as is known, pass into a palmella-like condition and dissolve into single cells, which not unfrequently become swarmspores. I must not yet, therefore, create any new species for the above-described Australian alga, which, as already noticed, was observed only in single filaments. Even if it cannot be identified with Brébisson's *H. transversalis*, it, nevertheless, seems to me, of all hitherto described algæ, to most resemble this, so that it might provisionally be treated as a variety of the same. In the present pamphlet I have cited the genus *Hormospora* in the place where it would stand according to De Toni's Sylloge; there it is added to *Hormiscia* as a 'genus incertæ sedis.' In my opinion it would better find its place amongst the Tetrasporaceæ in proximity to Palmodactylon, in which Kirchner, in his Algenflora Schlesiens, has placed it."

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*
(Plate VII., Fig. 3-6.)

STIGEOCLONIUM, Kütz.

S. protensum (*Dillw.*), *Kütz.* Cooke's British Freshwater Algæ, 190. Pale-green, cæspitose, slender; filaments and branches long drawn out; cells almost cylindrical, equal or twice as long as their diameter; terminal cell extended into a colourless bristle; branches usually scattered, rarely in pairs, with the extremities cuspidate, piliferous. Size: Cells, ·015 mm. diameter.—*Cooke l.c.*

The following description is given by **Prof. Moebius**:—"This alga forms tufts 15-18 mm. high. The filaments are single in the under portion, then dichotomously or trichotomously branched, more

rarely covered beneath with small branchlets. Higher up the ramuli are placed for the most part alternately to the main branches, and are given off quite irregularly on every side. The short thin ramuli are single, the longer again furnished with small branchlets; all the larger branches seem to terminate in long hairs. The cells of the stouter branches are 18-23 μ thick and 2-3 times as long, those of the thinnest branches only 5-7 μ thick; in form they are cylindrical, and only slightly constricted at the joints ('subcylindricæ,' De Toni), but not similar to the barrel-shaped form which Wolle figures (Fresh-water Algæ of the U.S., pl. 101). The illustration in Kützing (Tab. Phyc., Vol. III., T. 18) is very defective; and in Thuret (Ann. Sc. Nat. Bot. Ser. 3, Tom 14, tab. 18) only the formation of swarm-spores is represented. The Australian alga is also in process of forming swarmspores."

This species is known to occur in Europe and North America.

Hab.: Burpengary, *Dr. Thos. L. Bancroft.*
(Plate VI., Fig. 1-4.)

S. tenue, *Kütz.* Bright-green, lubricous; filaments a little branched, branches nearly simple; cells equal or 2-3 times as long as their diameter, more or less distinctly constricted; chlorophyllose bands narrow; branchlets scattered, shortened, nearly erect, subulate; cells at the base longer than broad, abbreviated towards the apex. Size: Cells, ·01 mm. diameter.—Cooke's British Freshwater Algæ, 189.

Dr. Cooke gives the following note:—"At first the filaments are enclosed, in the manner of a *Chætophora*, in a common, somewhat definite gelatine; afterwards, on its bursting, they issue from it like *Conferva*, but are at all times very gelatinous."—*Harvey.*

Prof. Moebius says:—"While I have set this species down as a *Stigeoclonium*, whose branches are not prolonged into hairs, it, nevertheless, in other respects possesses no characteristic peculiarities. The cells of the thickest branches are 13-14 μ thick; all the cells longer than thick, often 4-5 times as long."

This species, of which a whole series of forms is distinguished, is known to occur in Europe, North America, and Mauritius.

Hab.: Lower Freestone Creek, Warwick, 1893, *Frank Pigram.*
(Plate VI., Fig. 5-6.)

URONEMA, Lagh.

Filaments not branched, not invested with gelatinous substance adhering at the base, and formed of a single series of cells; apical cell acuminate, the basal attenuated, membrane of cells thin, hyaline, not lamellose; nuclei of cells single. Chlorophore single, parietal, in the form of a lamina, furnished with unequal margin and double pyrenoids (more rarely single). Propagation by macro-zoogonidia originating from the contents of all the cells of a filament, one, more rarely two (or more?) from each cell, macro-zoogonidia ovoid, furnished each with four vibratile cilia and a red spot, swarming through a large pore-like opening or upon rupture of the middle portion of the cell membrane, forming new filaments by germination; propagation, also, by resting spores formed by the contraction of the cell contents (or originating from zoogonidia?).—*De Toni*, vol. i., p. 176.

U. confervicolum, *Lagh.* Prof. Moebius remarks :—"I observed specimens of this species upon Œdogonium filaments. The cells are 6 μ thick and 2-3 times as long. The position of the point of adhesion has in this instance also the condition as I have described it for the Javanese form of this alga." (Ber. d. deutsch. bot. Ges., 1893, vol. xi., p. 118, Fig. 4.)

Hab.: Enoggera Creek, *Dr. Thos. L. Bancroft.*

CHÆTOPHOREÆ (Harv.), Hass.

HERPOSTEIRON, Næg.

H. confervicolum, *Næg.* Note of Prof. Moebius :—"Longer unbranched filaments of this species grow upon *Œdogonium crassiusculum.* As Huber (Ann. Scienc. Nat., 7 ser., Bot. T., 16, 2, 268) mentions, according to Nægeli's manuscript the unbranched filaments are characteristic of this species, whilst *H. repens,* Næg., mscr., are richly branched. The cells of the Australian alga are, however, not isodiametrical, but are 6-8 μ broad and 13-14 μ long, somewhat barrel-shaped when seen from above, with two pyrenoids, by which this form has a greater affinity to *H. Braunii,* Næg. mscr."

(Plate VII., Fig. 7.)

CHÆTOPHORA, Schrank.

Articulate filaments, with the primary branches radiately disposed, composed of elongated vegetative cells, with chlorophyll bands as in *Draparnaldia* and *Stigeoclonium*; divided upwards into numerous branchlets, which are shortly articulated, the ultimate joint attenuated, often empty, scarcely or not at all lengthened into a thread, ultimate branchlets in more or less crowded fascicles, involved in a firm gelatinous, coriaceous, or hard mass, of a globose or subglobose, or plane, expanded, variously lobed form. Propagation the same as in *Stigeoclonium.*—Cooke's British Freshwater Algæ, 193.

C. tuberculosa (*Roth.*), Ag. Syst. Cooke's British Freshwater Algæ, 194. Thallus subglobose, the size of a cherry, bright or pale green, surface tuberculose, elastic fascicles of branches very dense, lower articulation cylindrical, the upper swollen, extremities cuspidate, sharp pointed, rarely hair-like. Size : ·009-·012 mm., of branches ·008-·01 mm.—*Cooke l.c.*

Prof. Moebius says :—"The thallus is found upon pieces of wood, attains a size of several millimetres in diameter, and is of an irregular outline. The Australian form differs from the European form, which I have examined in preserved material, and Kützing's illustrations in so much as the cells are more slender, and the terminal branches do not stand in such thick clusters; it might be more appropriately included in the variety *Pilifera,* Kütz. The specimens collected at Burpengary, which were in process of forming swarm spores, bear numerous hairs projecting from the gelatinous envelope, whilst in the other specimens the hairs are more rare; this evidently depends upon the conditions of development, since the first were collected in November, the others in May. In the upper branches the cells are 8-10 μ thick and 4-5 times as long. Remarkable is

the abundant formation of rhizoids, even by the upper branches. The branchlets of rhizoids are known by their thinner irregularly shaped cells, almost destitute of chlorophyll, the membranes of which are in places considerably thickened, as well as by their course being usually directed more downwards, and are clearly distinguished from the upright branches. The latter serve the purposes of assimilation and propagation, whilst the former are evidently designed for the closer connection of the branches. Strange to say these branches of rhizoids seem to have been hitherto overlooked in *Chætophora*; at any rate I find them nowhere noticed, not even by Berthold, who yet in other respects expresses himself fully with regard to the branching of *Chætophora*. I have, therefore, also subsequently examined other species of *Chætophora*, and found the branches in question not only in *Ch. tuberculosa*, but in *Ch. pisiformis* and *elegans*, which species Berthold has examined; on the other hand, I have not found them in *Ch. endiviæfolia* and *Ch. punctiformis*, presently to be mentioned."

Ch. tuberculosa is known to occur in Europe, North America, and New Zealand.

Hab.: Burpengary; collection, November, 1892; Dalby, Darling Downs, *Dr. Thos. L. Bancroft*; collection, May, 1893.

(Plate V., Figs. 1-2.)

C. punctiformis, *Kuetz.* In Cooke's British Freshwater Algæ, and in Wolle's Freshwater Algæ of the U.S. of Amer., this plant is placed in the genus *Rivularia*. Both notices are here given:—

"*Rivularia echinata*, English Botany, in Cooke's F.W. Algæ, 278. Syn.: *Chætophora punctiformis*, Kuetz.; *Conferva echinata*, Eng. Bot.; *Conferva echinulata*, Gray. Globose, very minute, dark-coloured, compact. Threads fastigiate, attenuated upwards to the apex, closely cohering, articulated, heterocysts basal, globose. Sheaths very narrow, almost inconspicuous. Size: Trichomes ·007 mm. at base, ·25 mm. long."—*Cooke l.c.*

"*Rivularia echinulata*, Sm. Wolle's Freshwater Algæ of U.S. of Amer. Syn.: *Chætophora punctiformis*, Kg.; *Echinella articulata*, Eng. Fla.; *Conferva echinata*, Eng. Bot.; *Conferva echinulata*, Gray. Thalli globose, minute, dark olive-green or brownish. Trichomes fastigiate, attenuated upwards to the apex, closely cohering, articulate: heterocysts basal, globose; sheaths very narrow, inconspicuous. Diameter of trichomes at base, about 7 μ; 250 μ, more or less, long." *Wolle l.c.*

Prof. Moebius says:—"This alga was found adhering to the leaves of *Marsilea*. In appearance and also in the details of its structure the alga examined agrees especially with the illustration which Kützing gives of the known species (Tab. Phyc., Vol. III., Tab. 18). De Toni, in his Sylloge, has excluded this species from the genus *Chætophora*, and relies upon a statement of Phillips (in Grevillea IX., p. 5), who declares the alga distinguished as *Ch. punctiformis* to be a *Rivularia*, and very likely identical with *Gloiotrichia Pisum*, Thur. Indeed, I also believed at first sight that I had a *Rivularia* before me (the colouring matter was extracted by the alcohol), until by more exact consideration of the conditions of branching and the demonstration of starch in the cells I satisfied myself that it was a

Chlorophycea, and in point of fact a *Chætophora*. Since it is evidently the same alga which Kützing figures, it can, therefore, only belong to the species *Ch. punctiformis*—the more so that it possesses very characteristic peculiarities. If the tiny cushions scraped from the leaves are squeezed flat with the cover-glass a multitude of young filaments are seen radiating outwards from one point; these filaments are about 140 μ long. If the middle portion of the thallus is examined it is seen that here the radiating filaments are given off abundantly and close to each other—partly from the creeping filaments, partly also are formed as branches from the undermost cells of the radiating filaments themselves; whilst in the upper portions of the thallus a branching only rarely appears. At the base of the filaments the cells are thicker and almost barrel-shaped; passing upwards they are thinner and more cylindrical; the terminal cell of a filament is pointed, generally possessed of scanty contents or destitute of contents, and corresponds to the many-celled hair, in which the branches terminate in many other species of *Chætophora;* the diameter of the cells in the middle portion of the thallus amounts to 6-8 μ. The structure of the thallus in this case is, therefore, corresponding to its microscopic dimensions, much simpler than in the other species, since the upright branches are all pretty equivalent and equally large; its branching is extremely small; rhizoidal branches are not formed at all, and the hairs only consist of one not even lengthened cell. Probably this delicate alga is generally overlooked on account of its minuteness; it seems hitherto only to be known to occur in England."

Hab.: Dalby, Darling Downs; collection, May, 1893, *Dr. Thos. L. Bancroft.* (Plate V., Fig. 3-5.)

CHÆTOSPHÆRIDIUM, Klebahn.

C. Pringsheimii, *Klebahn.* Prof. Moebius remarks:—"This alga, already described by me (see Botany Bulletin No. VI., pages 18-19), was also on this occasion observed amongst other algæ (*e.g.*, upon the sheath of *Microcoleus paludosus*), unfortunately without my being able to discover any trace of organs of propagation."—Collection at Burpengary, November, 1892.

C. ? Huberi, *Moebius* (n. sp.). Prof. Moebius says:—"Under this name I may here describe an alga which seems to me to be intimately related to the preceding, and on that account I provisionally place it in the same genus. It grows in the gelatinous substance of *Chætophora tuberculosa* (from Dalby, May, 1893), and in fact, at the spot where this plant is joined to the substratum, wherefore it is difficult to obtain larger coherent parts of the alga in the preparation. The thallus is filamentously branched, and consists of creeping filaments from which upright ones rise; the latter, however, remain short; the cells in both display the same characteristics, approximately cylindrical, but often arched and swollen, on one side, so that the septa stand at different angles to one another. The branches originate from a lateral outgrowth of the cells, and then by separation into joints; they do not seem to be arranged in a definite succession of rows, and they do not branch widely. The cell-contents cannot be very clearly discerned, yet a large chromatophore with a pyrenoid seems to be present, as in *Chætosphæridium*

Pringsheimii. What, however, says most for the relationship with this alga is the bristles. These proceed from the point of single terminal cells, whilst the cells are prolonged into a very long and very thin filament, which though only invested with the outer membrane is yet so thin that the membrane and contents can scarcely be distinguished. The outer membrane surrounds the base of the hair as a sheath, and is particularly thickened at the lower limit of the hair, in all respects as I have represented it for *Chætosphæridium* (under the name *Aphanochæte globosa* in the Biolog. Centralbl., vol. xii., p. 104). The peculiar coil-like unwinding of the thin portion of the hair is also found here corresponding in all respects to the illustration which Klebalm gives of it (Pringsheim's Annual, vol. xxiv., Pl. IV., Fig. 9)—viz., nearly in such a way that intercrossing loops are formed. I have not noticed a spiral unwinding. *Coleochæte* is the only other genus whose species possess bristles with sheaths, but here the bristles proceed from the back of the cell, not from its end, and have also a somewhat different structure in other respects. Unfortunately, I have not succeeded in finding organs of propagation in my alga; but in *Ch. Pringsheimii* also the formation of these is not yet quite thoroughly known. The latter alga essentially differs from the present by the peculiar sympodial branching, and the formation of empty connecting canals between the living cells; but is not this branching actually produced by the existence of the empty connecting limbs? Yet certainly no side branches can proceed from these, and the cells with contents cannot grow further at the point, because they have here formed a bristle. In the other species where the contents do not spread further within the membrane, but a regular cell-formation exists, the branching accordingly also takes place in a different way. Nevertheless, the thallus of both species is alike in this respect that creeping and upright filaments are formed, and branching of a higher grade scarcely occurs. Herr Huber, to whom we owe the exact examination of the endo- and epiphytic *Chætophoreæ*, and in whose honour I take the liberty of naming the new species, had the kindness, in answer to my question, to communicate to me his opinion upon the relationship of this alga, and what I have here remarked is in accordance with his opinion. Perhaps when attention is once directed to it, this small alga may be found in greater abundance, and its development may be investigated. The following diagnosis of it may be provisionally assigned:—Thallus filamentosus, irregulariter ramificatus, e ramis procumbentibus et ramis erectis, parce ramosis, constitutus, cellulis cylindricis et irregulariter inflatis et incurvis, 8-10 μ crassis, diametro plerumque longioribus, setis terminalibus ad *Chætospheridii* modum institutis, membrana tenui, chlorophoris et pyrenoideis singulis. Sporangiis ignotis. Habitat in thallo gelatinoso *Chætophoræ tuberculosæ* in Australia. (Thallus filamentous, irregularly branched, consisting of creeping filaments and erect filaments sparsely branched; cells cylindrical, irregularly swollen and arched, 8-10 μ thick, in diameter for the most part longer; furnished with terminal bristles in the manner of *Chætosphæridium*; membrane thin, chlorophores and pyrenoids single. Sporangia unknown. Habitat in the gelatinous thallus of *Chætophora tuberculosa* in Australia)."

(Plate VIII., Fig. 6-7.)

TRICHOPHILUS, *Web.* v. *Bosse.*

Thallus aerial in its habitat, made up of jointed filaments irregularly branched, expanded in thin layers, bright green, separate filaments broadly confluent, for the most part gradually attenuated towards the apex, creeping. Branchlets with one or few joints without root-like appendage. Vegetative cells cylindrical, equal to the diameter or half as broad as the length, slightly constricted at the joints. Chlorophores scanty, the central space without colour, surrounded with minute granules; membrane hyaline, firm, composed of two layers. Inflated vegetative cells are converted into zoogonidia. Propagation by macro-zoogonidia and micro-zoogonidia. Macro-zoogonidia free, ovate at the anterior hyaline end, each furnished with four vibratile cilia, contents green, red eye-spot not seen. Micro-zoogonidia arise from successive repeated subdivisions, 32 in each cell, liberated by a pore-like lateral opening in the wall of the mother-cell, smaller than the macro-zoogonidia, ovate or angular, and destitute of cilia. Sexual generation hitherto unknown.—*De Toni*, Syll. Alg., i., 249.

T. (species nov.) Prof. Moebius says:—"Upon the cells of a nitella I observed an epiphytic alga, which not only in its appearance vividly calls to mind *Tr. Welckerí*, Web. v. B., but also in its characteristics answers to the diagnosis of the genus, and only differs from it in living not in the air but in the water. The thallus consists of short, irregularly branched, creeping cell-filaments, which grow together into a more or less closed disk of cells. The branches rise from the middle of the cells; frequently, however, the formation of branches is not completed, so that the cells are seen only with a lateral outgrowth. Moreover, the shape of the cells is irregular; sometimes they are more globular, sometimes more cylindrical, straight, or curved. Their diameter fluctuates between 20 and 40 μ; the common vegetative cells are usually 20-30 μ thick. They have a compact membrane, a nucleus, and numerous small disk-shaped chromatophores (as *Trichophilus ?*). Any cells become sporangia when the contents divide by successive subdivisions into a number of portions (swarmspores, or gametes) (as *Trichophilus ?*). Moreover, I observed not more than four portions of plasm which had originated in one cell through such subdivisions.

"Of *Trichophilus* two species are already known—the above-mentioned *T. Welckeri*, which lives upon the hairs of the sloth; and *T. Neniæ*, Lagerh., which occurs in the shells of a land snail. Considering the diversity of the habitats of both these species, it is, perhaps, not extraordinary that another species grows as an epiphyte upon water plants. Yet I must not express myself with certainty with regard to the question whether the foregoing alga, which I have not been able to examine in the living state, should be classed with the genus *Trichophilus* or another genus which, perhaps, is nearly allied to *Chætopeltis*. However this may be, I would not omit to describe and figure the alga."

Hab.: Burpengary, *Dr. Thos. L. Bancroft.*

(Plate VII., Fig. 1, 2, 2*a*.)

RHIZOCLONIUM, Kuetz.

Articulate thread the same as in *Conferva*, but distinctly contorted, and forming by prolification of the cells short root-like processes.—Cooke's British Freshwater Algæ, 140.

R. hieroglyphicum, *Ag.* Vegetative green or yellowish green, forming thin webs or mats of considerable extent on moist ground. Cells, 1½-3 times as long as the diameter. Diameter of filaments, 20-25 μ, rarely 29 μ.—*Wolle*, Freshwater Algæ of U.S. of Amer., 144.

The following is Prof. Moebius' description:—"Cells 17-19 μ thick, 1½-3 times as long, cylindrical. The filaments are seated firmly at the base, with a branched rhizoid, and form also in places short side-shoots, protuberances at the side of the cells. In the cells in the act of division it is seen that the contents are already separated into two portions, whilst the partition-wall is present at first as a ring-shaped mark in the middle of the cell."

This species is known from Europe, North and South America; varieties of it also from New Zealand.

Hab.: Burpengary, *Dr. Thos. L. Bancroft.*
(Plate VIII., Fig. 5.)

CLADOPHORA, Kuetz.

Articulate thread variously branched; cell-membrane usually thick, lamellose; cell-contents parietal. Propagation by zoogonidia, arising from simultaneous and multipartite division of the cell-contents, moving actively within the mother-cell, afterwards escaping by a lateral or terminal opening, furnished with 2 or 4 vibratile cilia, afterwards germinating without fecundation.—Cooke's British Freshwater Algæ, 141.

Dr. Cooke notes that many species are entirely marine, but some few are fresh water. All are disposed to considerable variation, and numerous varieties are named in connection with each of the fresh-water species.

C. parvula, *Moebius* (n. sp.). Prof. Moebius says:—"In my former work I have already expressed my surprise that the *Cladophoræ* occurring so abundantly in our waters were wholly absent from the Australian freshwater algæ sent by Mr. Bailey; certainly none of the larger species of *Cladophora* were contained in the new material. So much the more interesting was it to me to find amongst the filaments of *Scytonema cincinnatum* and a sterile *Vaucheria* a very small species of the genus referred to which does not appear to have been yet described, and to which consequently I may give the name *Cl. parvula.* The entire plants are only 5-8 mm. long; their under portion is unbranched, and, moreover, the undermost cell terminates without antler-like branching; their upper portion is on the contrary richly branched. The branches are given off on every side alternately from the main-axis; the longer are again in like manner branched, the shorter single. I have only observed branching of the second grade. The terminal cells are scarcely attenuated above, and end in a steep arch. The cell-membrane is, in the under portion of the thallus, thick and stratified; in the thinner outer branches it is thin and not stratified. The cell-contents appear filled with vacuoles. The cells are somewhat thinner in the upper portions of the thallus than in the under portions; the diameter

fluctuates between 24 and 50 μ; their length is 4-8, rarely as much as 14 times the diameter; their form is cylindrical, and they are slightly constricted at the septa. The sporangia originate from older intercalated cells; in one piece of filament were observed several sporangia beside each other, in which the greater portion of the zoospores had germinated and grown into small plants, since the sporangia had evidently not been able to discharge their contents—a phenomenon indeed which is also sometimes noticed in the *Cladophora* species of our country. The characteristics of this species may be summed up in the following diagnosis:—Cl. thallo minuto, 5-8 mm. alto, e parte basali simplicé et parte superiore ramosa constituto: ramis undique exeuntibus, brevioribus simplicibus, longioribus ramigeris, cellulis cylindricis, ad genicula leviter constrictis, 24-50 μ crassis, 4-8 raro ad 14 plo diametro longioribus, sporangiis intercalaribus e cellulis vetustioribus evolutus. (Thallus very small, 5-8 μ high, formed of a single basal portion and a branched superior portion: branches given off on every side—the shorter single, the longer branched; cells cylindrical, slightly constricted at the joints, 24-50 μ thick, 4-8 rarely as much as 14 times longer than the diameter; sporangia originating from older intercalary cells.)"

Hab.: Charley's Gully, Lower Freestone Creek, Warwick, in slowly flowing water, ***Frank Pigram.***

(Plate VI., Fig. 7, 8, 9.)

VAUCHERIA, DC.

V. sessilis (*Vauch.*), *DC.*—Loosely intricate, pale or rather dull green. Thallus capillary, sparingly branched; oogonia 2 to 3 approximate, rarely single, ovate or oblong-oval, more or less oblique, rostrate; antheridia intermediate, either short, hamate, or straight and subulate, or a little clavate, sometimes elongated and incurved, rarely circinate. Mature oospores punctate with brown, involved in a triple membrane. Size: Oospore, ·07 mm. diam.; thread, ·07 mm. (Cleve).—Cooke's British Freshwater Algæ, 123.

Prof. Moebius says:—"This alga was found in abundant fructification, but in a form somewhat more slender than that in which it usually appears. The filaments are only 40 μ thick (as compared with 50-120, according to the descriptions of other authors). The oogonia appear for the most part single; the ripe spores are 50-60 μ broad, and 75-88 μ long; in their membrane may be distinguished a fine stratification, but not three distinct layers."

Known from Europe, North America, and New Zealand. Var. *subarticulata* from Brazil; probably it is generally distributed.

Hab.: Ithaca Creek, Brisbane, *Dr. Thos. L. Bancroft.*

(Plate VIII., Fig. 15-16.)

NOTE.—The student is referred to the further information supplied in Dr. Carpenter's treatise; The Microscope and its Revelations, 7th edition, by Dr. Dallinger, pp. 492-3; and to the figures on the last-mentioned page; also to Bower's Practical Botany, pp. 429-436; to Parker's Elementary Biology, p. 169, fig. 39; and to Strassburger and Hillhouse Practical Botany, pp. 250-254, figs. 87 and 88.

VOLVOX, Ehrb.

? V. aureus, *Ehrb.* These are large spherical cells, surrounded by a thick, smooth, colourless, often lamellate epispore, found within a mother cœnobium, probably merely resting spores.—*Wolle,* Freshwater Algæ of U.S. of Amer., 158.

The following note is given by Prof. Moebius:—"The observed *Volvox*-sphere does not permit the particular cells to be seen with sufficient distinctness to render possible an exact determination. It contains several parthenogonidia, and has a diameter of 260 μ. Since *Volvox globator*, which is cited in Bailey's list, has as a general rule larger colonies (680-800 μ), and on the other hand the diameter of the colonies mentioned for *V. aureus* is 200-460 μ, the alga observed, perhaps, belongs to the latter species."

Hab.: Dalby, Darling Downs; collection, May, 1893, *Dr. Thos. L. Bancroft.*

Note.—The habitat given for *Volvox globator* in Botany Bulletin No. VI. was Victoria Park, Brisbane. Since the publication of that Bulletin, Mr. W. J. Byram has found that the ponds in Bowen Park perfectly teem with this beautiful alga from about the month of November until June. As far as present observations go, the numbers rapidly decrease both in the great heat and in the frosts.

PANDORINA, Ehrb.

Cœnobium globose or subglobose, invested by a broad colourless hyaline tegument; cells green, granulose, globose (16, 32, or 64), included within a single rather thick membrane, bearing two vibrating cilia, with or without a red spot, aggregated in a botryoid manner.—Cooke's British Freshwater Algæ, 67.

Dr. Cooke gives also the following extract from Quart. Micro. Journ. (1856), p. 49:—"Henfrey's emended character of this genus was in the following terms: Frond a microscopic, ellipsoidal, gelatinous mass, containing, embedded near the periphery, sixteen or more bicillated, permanently active gonidia, arranged in several circles perpendicular to the long axis of the frond. The gonidia almost globose, with a short beak-like process, a red spot, and a pair of cilia which project through the substance of the front to form locomotive organs upon its surface. Reproduction—I., by the conversion of each gonidium into a new frond within the parent mass; II., by the conversion of the gonidia into encysted resting spores, which are set free and (?) subsequently germinate to produce new fronds."

P. morum, *Ehrb.* Cœnobium globose. Cells green, 16-32, arranged about the periphery. In the forms which produce the resting spores the cells are crowded together in the centre. Resting spores, after becoming encysted, bright-red. Size: Cœnobium ·2 mm.; cells ·01-·015 mm. diam.—Cooke's British Freshwater Algæ, 68.

The following notes are given verbatim from Cooke's British Freshwater Algæ:—"Fronds hyaline from about 1·80″ downwards. Gonidia either 16, and then arranged in four circles of 4 or 32, and then in five circles—two at the poles of 4, and the intermediate three of 8 gonidia—which in the perfect form stand near the periphery, and wide apart. In the forms which produce the resting spores the gonidia are crowded together in the centre. The gonidia are green, but the contents of the resting spores, after they have become encysted, are converted into oily and granular matter of a bright-red colour."—*Henfrey.*

Pringsheim, in his memoir "On the Pairing of Zoospores" (Monatsbericht, Royal Academy Sciences, Berlin, October, 1869, translated in "Annals of Natural History," vol. v., 1870, p. 272), makes special reference to this species. He says that "asexual reproduction takes place in *Pandorina*, as in other multicellular

Volvocineæ, by the formation of a perfect young plant in each cell of the mother plant. By the gradual dissolution of the general envelope and of the special membrane of the mother cells, the young plants become free, and escape. In sexual reproduction, as in the asexual, the membrane of the old plant swells, and sixteen young plants are formed. The young plants, however, are (at least in part) not neuter but sexual, and either male or female. Whether the mother plant is monœcious or diœcious is difficult to determine, because the male and female plants are externally alike, and can hardly be distinguished with certainty during copulation. There is no striking difference in structure between the sexual and asexual plants, although, amongst the former, plants with less than sixteen cells, especially with eight cells, are oftener produced. Moreover, the dissolution of the membrane of the mother cell proceeds more slowly than in the case of neuter plants, one result of which is that the young asexual plants vary much in the extent of their growth, and continue united in groups of different sizes for a long time after their formation, according as a greater or less number of them have happened to become free from the gelatinous mass in which they were embedded.

"As the individual groups are at first motionless, and the mother plant loses its cilia during the formation of the young ones, the entire group is at first entirely quiescent. But afterwards the young sexual plants, like the neuter ones, produce upon each of their cells two cilia, which commence their motion as soon as the enveloping mucus admits of it, and thus ultimately the entire group assume a state of active rotation. During the rotation of the groups the same process of expansion and dissolution takes place in the membrane of the sexual plants as occurred in the mother plant; but the contents of the cells of the sexual plants do not undergo division, but combine to form a single zoospore, which becomes free by the rapid dissolution of the membranes. In their general structure these zoospores differ in no way from other zoospores. At their colourless apex they exhibit, like other zoospores, a red body placed on one side of the apex, and two long vibrating cilia, by which they move in the manner common to zoospores. The individual zoospores exhibit no marked differences, except that they vary in size within tolerably wide limits, but not in a manner to indicate the existence of two different sorts. Amongst the groups of isolated zoospores of different sizes some are at last seen to approach one another in pairs. They come into contact at their anterior hyaline apex, coalesce with one another, and assume a shape resembling a figure of 8. The constriction which marks their original separation disappears by degrees; and the paired zoospores form at last a single large green globe, showing at the circumference no trace of their original separation. It may be seen, however, that the globe is larger than the individual neighbouring zoospores; that it has a strikingly enlarged colourless mouth spot, with two red bodies on the right and left, and that it is furnished with four vibrating cilia originating in pairs near the two red spots. The four cilia, however, soon become motionless, and together with the red spots disappear.

"This act of conjugation occupies some minutes from the first contact of the zoospores to the formation of the green globe. The latter becomes the oospore, which, after growing slightly larger and

assuming a red colour, germinates after a long period of rest, and brings forth a new *Pandorina*. There is hardly any appreciable difference, except in size, between the male and female zoospores. Most frequently a small zoospore pairs with a large one; but two of equal size often unite. Probably both the females and males vary much in size—the former more so than the latter.

"With regard to the entire plants from which the zoospores are produced, there is little doubt that those of the larger size are females; but the sex of the smaller and middle-sized ones cannot be determined with any certainty. The germination of the oospore is like that of other Volvocineæ, especially resembling in its early stage the germination of the resting spores produced by the micro-gonidia of *Hydrodictyon utriculatum*. The oospore bursts, and produces a single large zoospore (in rare cases two or even three), which divides into sixteen cells, and becomes a young *Pandorina*."—*Cooke l.c.*

Prof. Moebius gives the following note:—"Observed in fairly numerous specimens; several of them are in course of forming parthenogonidia. The largest colony which I observed has a diameter of 230 μ; complete cells (perhaps 32) have developed into daughter colonies, which possess a diameter of 40 μ (with envelope). The single cells are about 7 μ thick."

Perhaps generally distributed; mentioned from Europe, North America, Argentine, Afghanistan, New Zealand, Siberia.

Hab.: Dalby, Darling Downs; collection, May, 1893, *Dr. Thos. L. Bancroft.*
(Plate VIII., Fig. 8.)

PHACUS.

P. pleuronectes, *Nitsch.* Prof. Moebius gives the following note:—"Diameter, 20-40 μ; therefore in a smaller form."

Probably generally distributed.

Hab.: Victoria Park, Brisbane Swamps, 3rd November, 1892; collected at Burpengary, November, 1892 Dalby, Darling Downs, May, 1893, *Dr. Thos. L. Bancroft.*

(Plate VIII., Fig. 12.)

SCENEDESMUS, Meyen.

S. bigugatus (*Turp.*), *Kuetz.* (=*S. obtusus*, Meyen). Cells oblong or obvate, obtuse at the poles, 4-6-8 loosely connected in a simple series or joined obliquely, 3-5 times as long as broad. Size: Cells, ·0055-·007 mm. diameter.—Cooke's British Freshwater Algæ, 33.

Of *S. obtusus*, Meyen, Dr. Cooke *l.c.* says:—"This species appears to be much less common than *S. quadricauda*, from all forms of which it may be readily distinguished, not only by the difference in the form of the cells and absence of spines, but the remoteness of one cell from its neighbour and their alternation."

Prof. Moebius says:—"The form observed very much resembles that which is figured by Wolle in Freshwater Algæ of the U.S.A. (Plate 156, Fig. 22.) The cells are 8 μ long, 3 μ broad, slenderly egg-shaped, on one side with points more fully drawn out, alternating in two rows as in the var. *alternans* (Reinsch), Hansg., for which, however, larger dimensions are given."

Perhaps generally distributed; not yet mentioned for Australia.

PEDIASTRUM, Meyen.

P. duplex, *Meyen* (=*P. pertusum,* Kirchn.) Prof. Moebius gives the following note:—"Was several times observed in families of 16 and 32 cells. The lobes of the peripheral cells are finely indented, just as Kirchner figures them in his Microscopic Plant-world of Fresh Water" (Plate I., Fig. 22).

Known to occur in Europe and America, but perhaps generally distributed.

(Plate VIII., Fig. 9.)

SCIADIUM, Braun.

Plant from a single individual producing a family. Thallus (solitary) adnate, micellular; cell elongated, cylindrical, straight, attenuated at the base into a slender stem. Gonidia about 8, resulting from divisions of the cell-contents, at length protruding from the ruptured apex, retained at the mouth and extending in the form of an umbel, each individual becoming developed into a cylindrical cell like the mother-cell. This process is repeated to a third, or sometimes a fourth generation, forming a composite or decomposite umbel. Ultimate cells producing free biciliate zoogonidia.—Cooke's British Freshwater Algæ, 39.

The cylindrical cell of *Sciadium* possesses uniformly distributed green contents, which are interrupted, in perfectly developed cell, by light cross streaks, and are divided into a row of 5-8 about equal masses, which become gonidia. I could not detect nuclei in the individual segments of the contents passing into the formation of gonidia.—*Braun,* Rejuvenescence, p. 260.—*Cooke l.c.*

S. arbuscula, *Braun.* Cooke's Freshwater Algæ, 39. Umbellate. Cells straight (rarely falcate), obtuse at the apex; stem about as long as the diameter of the cells. Size: Cells, ·0038 mm. (rarely ·007 mm.) diam.—*Cooke l.c.*

Dr. Cooke also gives the following note:—"Braun, writing of this species—'It displays an originally obovate tube, generally becoming elongated into a cylindrical form, obtuse above, and prolonged into a slender attached pedicel below. The contents consist of uniform green mucilage, in which a small vesicle may sometimes be distinguished, but only in the earliest stage of growth. The pedicel is transparent and colourless, and secretes at its base an originally yellowish brown, afterwards dark-brown mass, which gradually expands into a disc-shaped foot. When the growth is completed the green contents become divided into several masses, developing into a series of 5 to 8 germ cells; the cell membrane dehisces, throwing off its summit as a finger-stall-shaped cover, but the germ cells, instead of leaving the open tube, all collect at the point of exit with their inferior, narrower, and somewhat pedicellately elongated ends sticking in the tube. Thus is produced a capitule, and by the advancing growth of the young family an umbel formed of individuals exactly resembling the parent individual from which they originated. The emptied mother-cell tube remains as the stem and support of the umbellate family, and gradually becomes filled from above downwards with the same yellow and reddish-brown secreted substance which it exhibits at its own base. The imperfect birth of the germ cells just described is repeated at the transition to the third and mostly even to the fourth generation, so

that little arborescent groups are produced with twice or thrice repeated umbellate ramification, till at length the cells which form the outermost umbellules scatter out their germ cells, which, after a short swarming, fix themselves again to be developed into ramified stocks of new families.'—*Braun*, Rejuvenescence, p. 187."

Prof. Moebius gives the following note :—" Was only observed in isolated specimens. Hitherto, perhaps, only known to occur in Europe and North America."

Hab.: Burpengary; collection, November, 1892, *Dr. Thos. L. Bancroft.*

KIRCHNERIELLA, Schmidle.

K. lunaris, *Schmidle* (= *Rhaphidium convulutum* (Corda), Rabh. var. *lunaris*, Kirchn.) The Rev. Francis Wolle, says (Freshwater Algæ of U.S. Amer., 198: *R. convolutum* (Corda), Rab.):—"The type form somewhat larger than the last (*R. Braunii*, which he gives as cells 5-7 μ) cells more curved; ends more acutely acuminate, green, homogeneous, single or two, three or four connected, usually back to back; other specimens, probably only other stages of development, are smaller; again other families are composed of larger and smaller forms intermixed; some have the ends more incurved than others. They occur in families of two or four, and again in more or less spherical masses containing hundreds. The distinctions between the different forms are not sufficiently constant to admit of separation. Some of the larger forms agree well with *Selenastrum Bibraianum*, Reinsch.—ends rather more acute; the smaller forms are *R. convolutum*, var. *lunare*, Kirch., but evidently these, with numerous intermediate stages, belong to the same species. Length of larger cells, 3 to 4 diameters; smaller ones about 2 diameters."

Prof. Moebius says :—" The dimensions and form of the cells agree with the notes of Schmidle, yet neither a gelatinous envelope nor a regular arrangement of groups into four appears remarkable to me. I found the alga discovered by me agreeing very well with an ...istration of it by Wolle in Freshwater Algæ of the U.S.A., who ...stinguishes it by the name given to it by Kirchner, and remarks with ...egard to it that it occurs in different forms. However, the new name *K. lunaris*, and not *lunata*, must be used, since Kirchner distinguishes his variety as *lunaris*. In Schmidle's work above mentioned it is referred to as *Kirchneriella lunata*, and as a synonym *Rhaph. conv.*, var. *lunara*—a misprint for *lunare*—since Kirchner has applied that adjective to the genus, and not as might be done more correctly to the variety. The alga is known from Europe and North America."

Hab.: Burpengary; collection, March, 1893, *Dr. Thos. L. Bancroft.*
(Plate VIII., Fig. 10.)

REINSCHIELLA (Reinsch), De Toni.

Cells isolated, free swimming, sub-cylindrical or semilunate, moderately curved inwards; ends extended, attenuated, sharp, and furnished each with a spine. Membrane thin, thickened towards the ends and drawn out into a spine; plasma coarsely granular and displaying here and there larger chlorophyllaceous granules.—*De Toni*, Syll. Alg., vol. i., 612.

R. longispina, *Moebius* (n. sp.). Prof. Moebius first gives the following Latin description :—"Cellulis cylindricis 6-7 μ crassis, triplo ad pluries longioribus, primum rectis, deinde arcuatis, denique (longissimis) convolutis, utroque polo obtuso-acuminatis et in longam spinam (membranæ) subtilem productis. (Cells cylindrical 6-7 μ thick, 3 times or more as long, first straight, then curved, at length (the longest) convolute, at each end obtusely-acuminate and prolonged into a long slender spine [of the membrane])." Prof. Moebius then remarks :—"The cells of this species were found pretty frequently swimming freely amongst other algæ. Particularly characteristic of the species are the long, thin, thorn-like prolongations of the membrane proceeding into a fine point. The condition of the cell-contents which, owing to the alcohol, had contracted into several portions in an irregular manner, does not admit of absolute determination. Since other species of *Reinschiella* are not known to me from personal examination, I asked Prof. De Toni for his view, and he courteously communicated to me his opinion that he also considered the Australian alga a new species, which, according to his view, has most resemblance to *R.* (*Closteridium*) *bengalensis*, De Toni, in litt. (= *Closteridium bengalensis*, Turner. Freshwater Algæ of East India, 1893, p. 158. Pl. XX., Fig. 25). Both, according to him, would belong to the sub-genus *Eureinschiella*, De Toni, in litt. "Cellulæ cylindricæ, arcuatæ aut convolutæ, utrinque cuspidatæ aut longe spinulosæ" (cells cylindrical, curved or convolute, pointed on both sides or drawn out into a long spine), whilst *Closteridium* species of Reinsch would form the sub-genus *Closteridium* (Reinsch), De Toni, in litt. "Cellulæ closteriiformes h. e. compressæ, utrinque cuspidatæ" (cells spindle-shaped—*i.e.*, straight, pointed on both sides).

Hab.: Burpengary, *Dr. Thos. L. Bancroft;* collection, November, 1892. Port Curtis District, May and June, 1892.

(Plate VIII., Fig. 13.)

ZYGNEMACEÆ.

MESOCARPEÆ, De Bary.

MONGEOTIA, Ag.

M. lætevirens (*A. Br.*), *Wittr.* Prof. Moebius gives the following note :—"Was on this occasion more frequently observed, also in one instance of somewhat larger dimensions (vegetative cells 34 μ thick). The zygotes show a glistening white and stratified membrane."

Hab.: Burpengary, *Dr. Thos. L. Bancroft;* collection, March, 1893.

ZYGNEMA, Ag.

Z. insigne, *Kütz.*, Cooke's British Freshwater Algæ, 83. Sterile cells equal, or twice as long as broad, copulation scalariform or lateral: zygospore globose or slightly oval; membrane brown, even. Size: Cells, ·026-·032 mm. diam.; zygospore about ·026 x ·032 mm., or globose about ·03 mm. diam.—*Cooke l.c.*

Dr. Cooke, l.c., gives the following note :—"The cells of this species at the time of conjugation are apt to become much distorted, inflated sometimes on one side, sometimes on the other, and even to conjugate in the manner represented by De Bary."

Prof. Moebius gives the following description:—"Cells, 27-28 μ thick and 1½-2 times as long. The filaments are surrounded with a thick gelatinous sheath, with which they are double as thick as without it. Zygospores spherical, 27-30 μ thick. The dimensions agree with the diagnosis."

Known from Europe and North America.

Hab.: Port Curtis district, May and June, 1892, *Dr. Thos. L. Bancroft.*

Z. cruciatum (*Vauch.*), *Ag.* Sterile cells equal or twice as long as broad. Zygospore spherical, formed in one or other of two conjoined cells. Membrane brown and scrobiculate. Size: Cells, ·028 mm. broad; zygospore, ·04 mm. diam.—Cooke's British Freshwater, Algæ, 79.

Prof. Moebius gives the following description:—"Vegetative cells, 33-40 μ thick and about as long, sometimes somewhat shorter, sometimes somewhat longer than the diameter. Zygospores spherical, almost filling the cells."

Known from Europe, North and South America.

Hab.: Dalby, Darling Downs, *Dr. Thos. L. Bancroft.*

Z. Rhynchonema (*Hansg.*), *De Toni.* The following is Prof. Moebius' description:—"The cells are 17 μ thick and 3-5 times as long, with thin smooth membrane. The conjugation always takes place laterally, and the zygospore lies directly over, in front of the septum of both the conjugating cells. In the unripe zygospore (ripe ones were not observed) the four chromatophores cannot yet be clearly recognised. The zygospores are 33 μ thick, which agrees exactly with the statement of Hansgirg; the same is the case with the dimensions of the filaments."

Hitherto perhaps only known from Bohemia.

Hab.: Burpengary, *Dr. Thos. L. Bancroft.*
(Plate IX., Fig. 11.)

SPIROGYRA, Link.

S. longata (*Vauch.*), *Kuetz.* (?) Sterile cells with the ends truncate, 3-8 times as long as broad, chlorophyll bands single or rarely two, making 1½-6 turns of a spiral. Spores 1½-2 times as long as broad, membrane even, chestnut colour. Sporiferous cells swollen and usually longer than the spore. Size: Cells, ·024-·03 mm. diam.; zygospore, ·04-·07 x ·03 mm.—Cooke's British Freshwater Algæ, 92.

Prof. Moebius says:—"In this species the cells in fructification are not swollen, and as far as this fact is concerned it would not be possible to assign to it the alga now being described; but in all other characteristics it is at any rate more like this than any other species, on which account I provisionally place it here. Vegetative cells 24-26 μ long to 10 times as long, with a chlorophyll band of 4-5 revolutions; fructifying cells shorter, the zygospores in somewhat swollen cells, egg-shaped, somewhat elongated, with rounded ends 34 μ thick, 60 μ long."

The species is known from Europe, North America, and Argentina.

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*
(Plate IX., Fig. 10.)

S. australensis, *Moebius* (n. sp.) Prof. Moebius first gives the following Latin description:—"Sp. cellulis vegetativis cylindricis, 50 μ crassis, 2-3 plo longioribus; chlorophoris singulis, anfractibus $2\frac{1}{2}$-2; cellulis fructiferis æque longis ac vegetativis vel plerumque longioribus, non tumidis, tubulo copulationis a filo masculo exeunte longiore tubulo a filo femineo exeunte; zygotis ovalibus, 40-45 μ crassis, 74-77 μ longis, membrana externa hyalina tenui, interna crassiore, fusco-lutea, subtiliter verrucosa præditis." (Vegetative cells cylindrical, 50 μ thick, 2-3 times longer; chlorophores single, with $2\frac{1}{2}$-3 revolutions; the fructifying cells as long as the vegetative or generally longer, not swollen—the canal of conjugation issuing from the male filament longer than the canal issuing from the female filament; zygotes oval, 40-45 μ thick, 74-77 μ long, furnished with a thin, internal, hyaline membrane and an external thicker one, dusky-green, finely verrucose.) He then adds:—"This species is akin to *Sp. velata*, Nordst., and *Sp. dædalea*, Lagh., but is distinguished by the characteristics of the vegetative cells as well as of the zygotes. The former are 50 μ thick, 2-3 times as long, and contain a chlorophyll-band with $2\frac{1}{2}$-3 revolutions. The cells in fructification are as long or even generally strikingly longer than the vegetative, but not swollen. The canal of conjugation put forth from the male filament is clearly longer than that from the female filament, so that in this respect the new species approximates to *Sp. punctata*, from which, however, it differs in the form of the fructifying cells. The spores are eggshaped-elliptical, 40-45 μ thick, 74-77 μ long. The outer thinner cuticle is colourless and smooth; the thick inner one, on the other hand, is brownish-yellow and thickly covered with fine protuberances."

Hab.: Burpengary; collection, March, 1893, *Dr. Thos. L. Bancroft.*
(Plate IX., Fig. 1.)

S. nitida (*Dillw.*), *Link* (?). Sterile cells with the ends truncate and usually 2 to 4 times as long as broad; chlorophill-bands about 4, making 1 to 4 turns of the spiral. Spores elliptic-ovoid (almost almond-shaped), $1\frac{1}{2}$ times as long as broad, membrane even. Sporiferous cells persistent. Germinating plant clavate, radical cell much attenuated. Size: Sterile cells, ·072-·078 mm. diam. (Petit), ·08-·09 mm. (Cleve), ·06-·075 mm. (Rabh.), ·054-·077 mm. (Kirch.), ·07-·09 mm. (M.C.C.). Zygospore, ·1 x ·072 mm. (Cleve), ·11-·13 x ·07 mm. (M.C.C.).—Cooke's British Freshwater Algæ, 86.

Prof. Moebius remarks:—"The species now to be described agrees very well in most of its characteristics with *Sp. nitida*, but the spores are not yellowish (flavescentes), as is stated in the diagnosis, but chestnut-brown. They have likewise a thick, colourless outer membrane, which seems to be able to swell, and a thinner inner membrane of a chestnut-brown colour; both cuticles are smooth. The spores are egg-shaped with attenuated ends, 90-117 μ long, and 55-65 μ thick. The fructifying cells are hardly swollen, but somewhat shorter than the vegetative. These are 60-65 μ thick, and 5-6 times as long, and contain 4 chlorophyll-bands, each with 2 revolutions. For comparison I give these notes upon *Sp. nitida* in conjunction with the diagnosis: Cell. veget. 54-78 μ latis, $1\frac{1}{2}$-3 plo. long., chloroph. 3-5, anfract 1-$1\frac{1}{2}$; cell. fruct. parum inflatis, vix abbreviatis; zygotis ellipticis apice attenuatis, 60-90 μ crass., $1\frac{1}{2}$-2 plo long., maturitate flavescentibus. Hab. in Europa, America boreali, Algeria. (Vegetative

cells 54-78 μ broad, $1\frac{1}{2}$-3 times as long, chlorophyll-bands 3-5 with 1-$\frac{1}{2}$ turns; fructifying cells slightly inflated, scarcely shortened; zygotes elliptical, attenuated at the end, 60-90 μ thick, $1\frac{1}{2}$-2 times as long, at maturity yellowish. Hab. in Europe, North America, Algeria.)"

Hab.: Burpengary; collection, March, 1893, *Dr. Thos. L. Bancroft.*
(Plate IX., Fig. 5.)

S. maxima (*Hassall*) *Wittr.*, **var. minor,** *Moebius* (n.var.). Prof. Moebius gives the following note in Latin:—"Var. cellulis vegetativis 78-80 μ crassis, 2-3 plo longioribus; zygotis 80 μ longis." (Variation, vegetative cells 78-80 μ thick, 2-3 times as long; zygotes 80 μ long.) He then adds: "The present alga differs from the typical species in its more slender cells and smaller spores, for which reason it may be distinguished as a variety of the latter, with which it agrees in other respects. In the typical species, likewise, the vegetative cells are 77-160 μ, generally 132-138 μ thick and scarcely longer, here and there even shorter than the diameter; the spores 102-115 μ long and 77-84 μ thick. In the present case the cells and spores have the dimensions above mentioned (see Latin note). The cells contain 6-8 chlorophyll-bands, each with $\frac{1}{2}$-1 revolution. The fructifying cells are not swollen, but are shorter than the vegetative. Since the spores are lenticular, they appear according to their position circular or elliptical; their membrane at maturity is coloured a golden-brown. In conjugation irregularities more frequently occur, of which I shall only describe one. The canal of conjugation of one filament meets a septum in another filament, from which the cells adjoining this septum have each put forth a canal, and these three canals have completely coalesced even by partly growing round. Whether a reabsorption of the membrane has occurred cannot be discerned, the contents of the three conjugating cells have as yet remained in them. *Sp. maxima* is known from Europe, North America, Argentina, and Uruguay."

Hab.: Dalby, Darling Downs; collection, May, 1893, *Dr. Thos. L. Bancroft.*
(Plate IX., Fig. 2, 3, 4.)

S. rivularis, *Rabh.* (?) Diameter of vegetative filaments, 32-36 μ; cells of sterile plants 7-11 times as long as wide. Fertile cells usually about 4 times longer than wide; cylindrical or slightly tumid. Three spirals (rarely 2 or 4), lax, making $2\frac{1}{2}$-$3\frac{1}{2}$ turns in a cell. Zygospores oval-elliptical.—*Wolle*, Freshwater Algæ of U.S. of Amer., 220.

Prof. Moebius gives the following description:—"Vegetative cells 30-35 μ thick and 6-9 times as long, with two spiral-bands of 3 revolutions each in decussate arrangement. Fructiferous cells 2-3 times as long as thick, not inflated. Zygospores elliptical-egg-shaped, 20-33 μ thick, 50-65 μ long. The dimensions here specified do not agree in all respects with those of the typical species, whose cells are 36-38 μ thick and 4-11 times as long; yet Hansgirg mentions a var. *minor* whose cells are 24-30 μ thick and 3 times as long. The species, therefore, seems to vary to some extent in the thickness of the cells and their relative length; it is known from Europe and North America (in case the species mentioned by Wolle under the name *Sp. rivularis* really belongs to that species)."

Hab.: Burpengary; collection, March, 1893, *Dr. Thos. L. Bancroft.*
(Plate IX., Fig. 8-9.)

S. crassa, *Kuetz.* Sterile cells with the extremities truncate, equal or twice as long as broad. Chlorophyll-bands 4 or more, making ½-1½ turns. Zygopores broadly and obtusely oval, membrane even. Sporiferous cells persistent, not swollen. Size: Cells ·12-·15 mm. diam. (Rabh.), ·15 mm. diam. (Petit); zygospore ·14-·15 diam. (Petit), ·13 x ·12, ·14 x ·12, ·16 x ·12 mm. (M.C.C.).—Cooke's British Freshwater Algæ, 85.

Prof. Moebius says:—"Only observed sterile. The cells are 115-120 μ thick (according to De Toni they are 120-150 μ thick), and as long or somewhat longer than the diameter. Those which have just subdivided shorter than the diameter, hardly perceptibly constricted at the partition-wall; they possess 4-6 chlorophyll-bands with 1-1½ revolution each. The membrane is thin, and the species is distinguished by this characteristic especially from *Sp. setiformis* with thick, stratified membrane. It is, moreover, nearly related to *Sp. maxima* from which it is distinguished by the zygotes not being lens-shaped, but egg-shaped."

Known from Europe, North and South America.

Hab.: Port Curtis District, May and June, 1892, *Dr. Thos. L. Bancroft.*
(Plate IX., Fig. 6.)

S. bellis (*Hass*), *Cronan* (?). Sterile cells with the ends truncate, and usually 1½ times (rarely 3 times) as long as broad; chlorophyll-bands 5 to 6, making ½ or 1 turn, or nearly erect. Spores orbicular, depressed, with the membrane punctate or porose, chestnut colour. Sporiferous cells persistent, swollen. Germinating plant cylindrical, radical cell short and subcylindrical. Size: Cells, ·07-·08 mm.; zygospores, ·07-·08 mm. diam., ·-05-·06 mm. thick.—Cooke's British Freshwater Algæ, 88.

The following is Prof. Moebius' description:—"Only observed sterile. Vegetative cells 65-70 μ thick and 3-4 times as long, with about 6 chlorophyll-bands which are sometimes almost straight, at other times make as many as 2 revolutions. The filaments are distinguished by a thick gelatinous sheath (as much as 100 μ thick), and this together with the agreement in dimensions and other characteristics makes the determination pretty certain. At any rate, I have not observed in any other *Spirogyra* such a conspicuous gelatinous envelope like that which occurs in the *Zygnema* species. *Sp. nitida* should also (according to Nægeli) possess a gelatinous envelope. According to the description, the fructiferous cells in *Sp. bellis* are inflated, the zygotes brown, lens-shaped, 84-90 μ broad, and 57 to 60 μ thick."

It is known from Europe and North America.

Hab.: Port Curtis District, May and June, 1892, *Dr. Thos. L. Bancroft.*
(Plate IX., Fig. 7.)

GONATOZYGON, De Bary.

Filament cylindrical; joints elongated, slender, cylindrical, or narrow-fusiform without a constriction or inflation; ends truncate; endochrome a single central, longitudinal, undulatory, contracted band. Joints, previous to conjugation, disunited, and during the process bent into a knee-shape. Zygospore placed between the empty conjugated joints.—Cooke's British Desmids, 2.

G. Ralfsii, *De Bary.* Cooke's British Desmids, 2. Joints cylindrical with the ends somewhat dilated, 10 to 20 times as long as broad, rough on the surface with numerous minute scattered granules; endochrome sometimes bifid at the extremities, usually with a pale space at the centre, and with a longitudinal series of lighter-coloured dense corpuscles down the middle; zygospore orbicular, smooth, placed between the conjugating joints, which are bent in an angular manner. —*Cooke l.c.*

Prof. Moebius gives the following note:—"Cells 8-9 μ broad, 10-15 times as long, not attenuated at the ends, always more or less bent at an angle, not united in a series, membrane finely verrucose. Known to occur in Europe, Siberia, the Sandwich Islands."

Hab.: Port Curtis District, May and June, 1892, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 8.)

HYALOTHECA, Ehrb.

H. dissiliens (*Smith*), *Bréb.* Prof. Moebius says:—"This species is already noticed in my earlier work (see Botany Bulletin No. VI., pages 38-39), and it is there remarked that the filaments observed have no gelatinous envelope, and possess pretty small cells. This thinner form without gelatinous envelope would correspond to the form v. *minor* of Delponte (Desm. Subalp.), 'trichomatibus plerumque nudis.' The specimens observed on this occasion agree in dimensions with the earlier; they possess, however, in parts a gelatinous envelope which is about 42 μ thick."

Hab.: Dalby, Darling Downs; collection, May, 1893, *Dr. Thos. L. Bancroft.*
Gymnozyga moniliformis.—As before, see Botany Bulletin No. VI., p. 39.
(Plate X., Fig. 3.)

DESMIDIUM, Ag.

D. Baileyi (*Ralfs*), *De Bary* (*Aptogonum Baileyi,* Ralfs). Filaments triangular, twisted, joints united by each end of the lateral margins only, excavated between the angles, the lateral margins straight, not bicrenate—a characteristic which separates it from the other species. Diameter 25 μ, more or less.—Wolle's Desmids of the U.S. of Amer., 27.

Prof. Moebius' note:—"Cells about 20 μ broad. Known from North America, Brazil, Java, Senegal."

Hab.: Burpengary, November, 1892, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 4.)

DIDYMOIDEÆ (Reinsch), Hansg.

CLOSTERIUM, Nitzsch.

Prof. Moebius says:—"Of the species already noticed in my earlier work the following were again observed: *C. gracile,* Bréb.; *C. lineatum,* Ehrb.; *C. Dianæ,* Ehrb.; *C. parvulum,* Næg.; *C. Ehrenbergii,* Menegh."

(Plate X.: *C. gracile,* Fig. 18; *C. lineatum,* Fig. 13; *C. Dianæ,* former Bulletin No. VI., Fig. 33.)

C. setaceum, *Ehrb.* Cells, 500 μ long, of which the middle portion constitutes 200. The thin ends very long, slightly curved, and at the points a trifle thicker. Diameter in the middle 13 μ. Widely distributed; also already noticed by Raciborski amongst the Australian Algæ.—*Moebius.*

Hab.: Burpengary, November 1892, *Dr. Thos. L. Bancroft.*
(See former Bulletin, Fig. 33 bis.)

PENIUM, Bréb.

P. closterioides, *Ralfs.* Prof. Moebius says:—"The cells of this species are according to the diagnosis 40-44 μ thick, and 4-6 times as long; the form found on the former occasion (see Botany Bulletin No. VI., pages 42-3) was only 30 μ thick and almost 7 times as long. On this occasion I have observed a form which is 56 μ broad and 6 times as long; in other respects, however, it resembles the usual *P. closterioides.*"

Hab.: Farrar's Creek, February, 1892.
(See Botany Bulletin No. VI., Fig. 34.)

P. sp. (n. sp.?) Prof. Moebius says:—"I have, unfortunately, only observed one specimen; it is a very large form, which in shape most resembles *P. navicula*, Bréb., but in its dimensions it exceeds *P. digitus* (Ehrb.), Bréb. The cells are spindle-shaped, and at the ends suddenly very much attenuated, in the middle 105 μ thick; the whole cell is 546 μ long.

Hab.: Burpengary; collection, November, 1892, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 7.)

TRIPLOCERAS, Bail.

T. gracile, *Bail.* In isolated specimens. The specimen measured is 17 μ thick and 430 μ long, with 3 pointed ends, each end with 2 bristles. The species has already been mentioned.—*Moebius.*

Hab.: Port Curtis District, May and June, 1892, *Dr. Thos. L. Bancroft.*
(See Botany Bulletin No. VI., p. 44, and Fig. 36.)

DOCIDIUM, Bréb.

Frond very elongated, straight, constricted at the middle; segments with an inflation at the base (rarely not so), often with others above or with whorls of knot-like projections; ends abruptly truncate. Endochrome with a terminal rounded clear space at each end, in which are active granules.—Cooke's British Desmids, 12.

D. coronulatum, *Grun.* Smooth or finely punctate, subcylindrical, slightly attenuated near the ends; apices truncate, ornate with a crown of pearly teeth. Twelve times as long as broad. Diameter in middle, 38 μ; near the end, 33 μ.—*Wolle*, Desmids of the U.S. of Amer., 53.

Prof. Moebius says:—"Specimens again observed, and for the most part adhering in the form of a series. Cells 540 μ long; at the isthmus 20, at the end 33 μ broad. In this species the cells are furnished with a crown of small teeth-like projections, which in the adhering individuals catch each other alternately. Known from the Island Banka and from North America; var. *caldensis*, Wolle, from Brazil."

Hab.: Port Curtis District, *Dr. Thos. L. Bancroft.*
(Plate X., Figs. 1 and 2.)

DISPHINCTIUM, Næg.

D. Cucurbita (*Bréb.*), *Reinsch.* The following is Prof. Moebius' note:—"Frequent. Cells of fairly regular dimensions, 24 μ broad, 60 μ long; membrane finely punctate; in each half-cell a chromatophore with a pyrenoid. Known from Europe and North America."

Hab.: Port Curtis District, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 11.)

PLEUROTÆNIUM, Næg.

P. Ehrenbergii (*Ralfs*), *Delp.* Prof. Moebius says:—"Also on this occasion again observed in specimens as much as 600 μ long; many show some ring-shaped constrictions on both sides of the isthmus, as Delponte figures it (Desmids Subalp., Tab. XX., Fig. 3).

See Botany Bulletin No. VI., p. 45.
(Plate X., Fig. 12.)

P. ovatum, *Nordst.*, **var. inermis** (n. var.) Prof. Moebius first gives the following note in Latin:—"Var. cellulis minoribus (270 μ longis) et processubus dentiformibus destitutis." (Variation, cells smaller, 270 μ long, and without teeth-like projections.) He then adds:—"Bailey notices this species as collected by W. J. Byram in Victoria Park, Brisbane. (See Botany Bulletin No. VI., p. 45, Fig. 39 bis.) He figures it according to the figure given by Nordstedt, and gives also the dimensions assigned by the same author. I have on the other hand observed several specimens which I must class with a different variety, because in the first place it is clearly smaller, and in the second no teeth are present at the end. The ends are, seen from the side, cut off straight; the membrane is here furnished with pores by which fine projections of the plasm may be seen extending outward, very probably to the limit of the not very clearly perceptible gelatinous envelope. The cells are 270 μ long, at the isthmus 43-45, at the end 23-25, at the thickest places 66-75 μ broad; in shape they correspond in all respects to the typical *P. ovatum*; the membrane also is finely punctate. *P. ovatum* is also known from Brazil, New Zealand, and from the Cape."

Hab.: Dalby, Darling Downs, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 5.)

Translator's Note.—A reference to the drawing made from the specimens collected in Victoria Park shows that these were furnished with the teeth-like projections at the ends of the cell characteristic of the typical form described by Nordstedt, and the dimensions so nearly agreed with his that the latter were adopted. It will, therefore, probably be found that the typical form also occurs here.

PLEUROTÆNIOPSIS, Lund.

P. turgida (*Bréb.*), *Lund.* Prof. Moebius says:—"Already noticed earlier (see Botany Bulletin No. VI., p. 45, Fig. 39); on this occasion, moreover, found in somewhat larger specimens in which it is to be observed that every half-cell contains several plate-shaped chromatophores with several pyrenoids."

Hab.: Port Curtis District, May and June, 1892, *Dr. Thos. L. Bancroft.*

P. javanica (*Nordst.*), *De Toni.* Prof. Moebius' note is as follows:—"Found with the foregoing, from which it differs in the larger cells and their somewhat different shape. In shape the cells found by me resemble in all respects *Cosmarium javanicum*, figured by Nordstedt (De Alg. nonn. mus. Lugd. Batavi, f. 107); they are 125-130 μ long, 60 μ broad, with an isthmus 35 μ in breadth. Hitherto only known from Java."

Hab.: As in preceding.
(Plate X., Fig. 9.)

XANTHIDIUM, Ehr.

Frond deeply constricted; segments broader than long, compressed, entire, spinous, having a circular cylindrical or conical projection on both surfaces near the centre, which is tuberculated or dentate, or entire; end view elliptic.—Cooke's British Desmids, 129.

X. Smithii, *Archer.* Cooke's British Desmids, 133. Frond minute, in front view about as long as broad, constriction a wide notch; segments twice as broad as long, trapezoid; angles rounded, each presenting a pair of somewhat divergent, short, minute, acute spines; central protuberance a minute tubercle.—*Cooke l.c.*

X. Smithii, var. variabilis, *Nordst.* The following is Prof. Moebius' description:—"Cells almost exactly as long as broad (24 μ); isthmus 6 μ broad. Every half-cell at the four angles each 1 or 2 spines, between the angles no spines. Lateral lines and vertices somewhat curved inwards. The typical species is known from Iceland; the variation *variabilis* from New Zealand."

Hab.: Burpengary, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 15.)

COSMARIUM, Corda.

Prof. Moebius says:—"Of the species noticed in my earlier work, the following were again found on this occasion: *C. Seelyanum*, Wolle (Plate X., Fig. 22); *C. Meneghinii*, Bréb., *forma*; *C. obsoletum* (Hantzsch), Reinsch (Plate X., Fig. 23); *C. reniforme* (Ralfs), Archer; var. *compressa*, Nordst." Besides these I have observed:—

C. sexangulare, *Lund.* One-fifth part longer than wide; constriction deep; sinus linear within and widening outwardly. Semi-cells more or less hexagonal elliptic; ends truncate, sides obtusely rounded; end view elliptical; side view circular. Cytioderm (cell-membrane) finely punctate; diameter, 25-42 μ.—*Wolle,* Desmids of U.S. of Amer., 69.

The following is Prof. Moebius' description:—"Cells 32 μ long, 28 μ broad; isthmus, 8 μ broad, with angles considerably rounded, as the figure in Wolle's Desmids of the U.S.A. (Pl. 49, Fig. 13) shows it. Known from Sweden, Hungary, North America; var. *minor*, Japan; var. *minima*, New Zealand."

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 19.)

C. sp. (n. sp.?) Prof. Moebius gives the following description:—"Outline seen from the surface approximately circular, but from the side compressed; seen from above elliptical, seen from the side 8-figured. Cell 110 μ long, 94 μ broad, isthmus 43 μ broad. Half-cells straight at the base, then proceeding from each other in the shape of an arch. Membrane punctate, on the under bend of the semi-cell furnished with several minute spines. In shape and dimensions this *Cosmarium* is closely related to *C. pachydermum*, Lund., whose membrane is thickly punctate, but is not furnished with the small spines at the margin."

Hab.: Port Curtis District, May and June, 1892, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 20.)

EUASTRUM, Ehrb.

E. verrucosum (*Ehrb.*), *Ralf.* forma. Cooke's British Desmids, 63. Frond somewhat larger than broad, rough all over with conic granules; segments three-lobed, somewhat divergent, all the lobes broad, cuneate with a very broad shallow external sinus. Empty frond inflated and verrucose; semi-cell with one large central inflation, and a smaller one on each side, two on end lobe. Size: ·90 x 90 μ (R.), 100 x 100 μ (D.); diam. 75 μ (W.).—*Cooke l.c.*

The following description is given by Professor Moebius:—"Cells 117 μ long, 97 μ broad; isthmus 36 μ broad; vertical-lines shallow-concave; each half-cell has upon each side an upper and two lateral projections; these projections seen from above further show on each a knob, and at the rounded point of these projections and knobs the membrane is thickened and furnished with several prominences; moreover, the whole membrane is covered with verrucose granules. Seen from the side the cells are broadly truncated above and below. In shape this form manifestly approximates to the variation *intermedia*, Racib., for which, however, clearly smaller dimensions are mentioned; the figure of the latter was not accessible to me, on which account, and because the shape is particularly difficult to describe, I am figuring the form observed by me, at any rate, from the surface view. Known from Europe, Siberia, Japan, North America, Greenland, and Australia (Raciborski)."

Hab.: Burpengary; collection, March, 1893, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 16 *a*, *b*.)

MICRASTERIAS (Ag.), Meyen.

M. decemdentata, *Nægeli.* Suborbicular, granulate-punctate; semi-cells distinctly three-lobed or obscurely five-lobed; lateral lobes divided by a small obtuse-angled sinus into two lobelets having straight truncate margins, angles slightly produced and mucronate; polar lobe broadly truncate, separated from the adjoining lobe by a narrow linear sinus; apex broadly convex, sometimes sinuate, lateral angles slightly produced and mucronate; diameter, 83-100 μ.—*Wolle*, Desmids of U.S. of Amer., 126. This author says, "Nægeli gives the diameter as 40 μ; Delponte quotes subalpine forms at 50 μ; and Lundell the Sweden plant also at 50 μ."

Prof. Moebius says:—"The specimen observed has the following dimensions: 75 μ long, 85 μ broad, isthmus 28 μ broad, cells in the middle 20 μ thick. The vertex of the middle lobe is flatly arched, each side lobe furnished with one deep and two less deep incisions, and prolonged into four single teeth corresponding to these. Seen from above the cell appears spindle-shaped with tapering ends. Known from Europe, North America, Japan."

Hab.: Dalby, Darling Downs, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 17.)

Translator's Note.—This desmid is exceedingly common around Brisbane and Ipswich, and also occurred plentifully in a collection obtained from Ross Island, Townsville. The figure given by *Wolle*, Desm. U.S.A., Pl. XXXVII., Fig. 56, is appreciably different from the Australian form, which is in all respects as figured by Prof. Moebius.

M. Mahabuleshwarensis, *Hobs.* Prof. Moebius says:—"I have only found one empty half-cell into which some filaments of Nostoc had insinuated themselves. In shape it corresponds to Nordstedt's figure (New Zealand Algæ, Table II., Fig. 26), therefore to his form *C. novizelandica* of the group *B. compacta.* The dimensions of my alga are, however, somewhat smaller, viz.:—Distance between the ends of the two lowest points, 110 μ; between those of the two outer points of the upper lobe, 82 μ; length of the semi-cell without the points, 58 μ; breadth at the constriction below the end lobe, 23 μ. Known from Europe, North America, India, Burmah, Bengal, Java, New Zealand."

Hab.: Dalby, Darling Downs; collection, May, 1893, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 14.)

Translator's Note.—This desmid has also been found in ponds at Herston road, Brisbane, and at Blackstone, near Ipswich.

STAURASTRUM, Meyen.

S. muticum, *Bréb.* Cooke's British Desmids, 156. Segments smooth, elliptic; end view showing slightly concave sides, and three or five rounded angles. Zygospore orbicular, spiny; spines robust, cleft at the apices. Size: Length, 35 to 40 μ; diam. 33 to 38 μ.—*Cooke l.c.*

The following is Prof. Moebius' description:—"Cells 19-20 μ broad; seen from above, triangular with sides slightly drawn in and rounded angles, corresponding to the figure in Ralfs' Brit. Desm., Tab. 21, Fig. 4*a* and 4*c*. Perhaps generally distributed; known from Australia (Raciborski)."

Hab.: Swamp in Victoria Park, Brisbane, 3rd September, 1892, *Dr. Thos. L. Bancroft*
(Plate X., Fig. 10).

S. dilatatum, *Ehr.* Cooke's British Desmids, 162. Segments rough, fusiform, equal; end view with four short, broad truncate, entire rays. Size: Diam. 20 to 28 μ.—*Cooke.*

The following note is given by Prof. Moebius:—"Met with singly. Cells 30 μ broad; seen from above, triangular with rounded angles and drawn-in sides; the membrane covered with small granules which are arranged in transverse rows. Known from Europe, North America, Siberia, Burmah, New Zealand."

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*
(Plate X., Fig. 21.)

GLÆOTRICHIA, Ag.

Trichomes pseudo-ramose, distinctly vaginate; sheaths broad, often saccate at the base, transversely plicate. Spores originating in the lower part of the trichome.—Cooke's British Freshwater Algæ, 281.

G. natans, *Rabenh.* Globose or angular, tuberculose, variable in size and form, green becoming brownish; trichomes straight, torulose, flexuous, and hyaline above; lower joints more or less compressed. Sheath broad, here and there constricted, colourless or yellowish. Spores oblong, cylindrical; heterocysts subglobose. Size: Trichomes ·01-·12 mm. at base, with sheath; ·03 mm. diam. Spores, ·018 mm. and upwards; diam. several times as long.—Cooke's British Freshwater Algæ, 281.

Prof. Moebius says:—"At the outset this alga forms a small spherical layer adhering to the filamentus organs of plants; and the filaments of the layer distinctly radiate from the middle outwards. The older *thallomas*, on the other hand, form a pretty firm skin-like mass, in which the filaments are more arranged in rows. If a portion of the layer is squeezed under the cover-glass and examined with a low power, the basal portion of the filament, as far as it is surrounded with the brown-coloured sheath, is seen conspicuously rising from the remaining portion, which in alcohol appears colourless. The appearance ot the filaments agrees very well with the illustrations which De Bary gives in Flora 1863 (Pl. VII.) of *Rivularia angulosa*, Roth. (=*Gl. natans*), as well as with Kirchner's illustration in his Microscopic Flora of Freshwater (Pl. IV., Fig. 126). The dimensions of the Australian alga correspond exactly to those given by Bornet and Flahault (Revision des Nostoc. hétéroc.). Tbe vegetative cells are in the inferior portion of the filament 7-9 μ thick, and usually shorter than the diameter (from half as long to as long), of barrel-like shape. The spores are 13-14 μ thick; the longest, which I have measured, are 52 μ long; the colourless heterocysts are 8 μ thick. Known from Europe and North America."

Hab.: Dalby, Darling Downs, May, 1893, *Dr. Thos. L. Bancroft.*
(Plate XI., Fig. 15-19.)

SIROSIPHONIACEÆ, Rabenh.

HAPALOSIPHON, Næg.

H. Pumilus, *Kirchn.* Prof. Moebius remarks:—"Again found abundantly in the form described on the former occasion." **(See Botany Bulletin No. VI., p. 51.)**

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*
(Plate XI., Fig. 10-14.)

STIGONEMA, Ag.

S. hormoides (*Kuetz.*), *Born. et Flah.* Prof. Moebius says:—"I not only found this alga again in the ordinary vegetative condition in which I have described and figured it in my earlier work (see Botany Bulletin No. VI.), but also in a form which probably corresponds to the resting condition. The filaments consist of cells arranged together like a string of pearls, of which each has a special envelope, whilst the membranes of the separate cells are blended in one common gelatinous sheath. In each cell may be distinguished an inner, thicker, and clear-brownish coloured membrane, and an outer, thinner, darker membrane. Where, however, the cells abut upon each other, the outer membrane seems to be interrupted or to become excessively thin. Both membranes are perforated by the plasmic processes which pass from one cell-contents to another. In many cells the contents are seen separated into two portions, and this division is probably the beginning of the formation of branches. At the ends of separate branches is seen the transition into the usual condition of *Stigonema*, since here the plasmic corpuscles of the cells are not separated by a double membrane, but the outer membrane becomes thin and disappears and the inner passes into the usual colourless sheath. Since these ends of branches grow farther and develop branchlets, they are, perhaps, to be distinguished from a

formation of hormogonia. It seems, on the contrary, that the portions whose cells have become surrounded with firmer membranes and rounded against each other had passed into a resting condition and finished an interval of quiescence—once more, however, to begin to grow anew and develop branches. Yet I am not aware that similar resting conditions of *Sirosiphoneæ* have already been observed."

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*
(Plate XI., Fig. 1, 2.)

MICROCHÆTE, Thur.

M. tenera, var. major, *Moebius* (n. var.) Prof. Moebius first gives the following Latin description:—"Filis ½-1 mm. longis, 12-14 μ crassis; cellulis 8-10 μ crassis, inferioribus diametro paullo longioribus, superioribus brevioribus. (Filaments ½-1 mm long, 12-14 μ thick; celis 8-10 μ thick, the lower somewhat longer than the diameter, the upper shorter.) The foregoing alga agrees substantially with *M. tenera*; it is distinguished, however, by somewhat thicker filaments. The filaments form small flakelets attached to other algæ, and proceed from each other from one common point of adhesion usually bent convex outwards. Besides the basal heterocyst, which is oval-spherical and smoothed on the upper side, there may occur in the filament one or two other heterocysts, which have a more cylindrical shape and are 15-18 μ long. The cells adjoining the heterocyst have frequently a conical shape. In the under portion of the filament the cells are usually somewhat longer than thick and distinctly constricted at the septa. The terminal cells are, moreover, rounded almost against each other, and are distinguished by their less compact plasm. The empty sheath extends for a considerable distance beyond the end of the row of cells. I have not found spores. This species is, perhaps, only known from Europe."

Hab.: Dalby, Darling Downs, *Dr. Thos. L. Bancroft.*
(Plate XI., Fig. 6-7-8.)

SCYTONEMA, Ag.

S. cincinnatum, *Thur.* Usually forms dark-green or brown floating mats, with filaments much interwoven. Vegetative cells short, often contracted at the margins, three to six cells to a diameter; contents æruginous. Heterocycysts short, ellipsoidal or globose, single or two (or more) in series of golden-yellow colour; diameter the same as the cells. Sheaths primarily thin and colourless, later yellow or brown and thicker. Diameter of internal filament 14-18 μ; sheath 14, 5-25 μ.—*Wolle*, Desmids of the U.S. of Amer., 254. This author remarks that, "inasmuch as this plant occurs in masses without branches and without heterocysts, it justly represents Kuetzing's plant *Lyngbya cincinnatum;* and again in simple filaments with heterocysts, it agrees with Kirchner's *Chrysostigma cincinnatum.* The different forms occur at different seasons of the year."

The following is Prof. Moebius' description:—"Diameter of the filaments about 35 μ. Cells 18 μ thick, ⅓-½ as long; heterocysts almost quadrate; sheath yellowish and lamellose; side branches equal to the main branches, present in small number. Known from Europe, Brazil, the Sandwich Islands, and Sumatra."

Hab.: Charley's Gully, Lower Freestone Creek, Warwick, in slowly flowing water, *Frank Figram.*
(Plate XI., Fig. 20.)

S. sp. Prof. Moebius says:—"The filaments observed form little flakes amongst other algæ, but are not in good preservation. The filaments are 13-15 μ thick; the cells only 6-7 μ thick, and as long or somewhat shorter or longer than the diameter; the heterocysts $\frac{1}{2}$-3 times as long. The sheaths are thick and lamellose, but colourless. The branches given off in pairs equal to the main filament. Since I can identify this alga with none of the species classified by Bornet and Flahault, it is perhaps new."

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*

TOLYPOTHRIX, Kuetz.

Trichomes spuriously branched, pseudo-branches spreading. Ramifications rarely geminate, oftener solitary, and originating at a point where the continuity of the trichome is interrupted by heterocysts; one or several heterocysts placed directly above each branchlet.—Cooke's British Freshwater Algæ, 268.

T tenuis, *Kuetz.* Small cæspitose tufts on water mosses, gelatinous, olive-brown; filaments sparsely branched; articulations about as long as broad, often indistinct; light æruginous or yellowish; sheath very thin, colourless or yellowish; heterocysts usually single, spherical or somewhat longer than broad. Diameter of filaments, 3-4 μ.—Wolle's Freshwater Algæ of the U.S. of Amer., 265.

Prof. Moebius gives the following description:—"Separate amongst other algæ. Filaments 7 μ thick; cells 6 μ thick, 2-3 times as long; septa indistinct, contents coarsely granular. At the spots where branches are given off the sheath is sometimes inflated, as is also mentioned by Bornet and Flahault; here lie one or more heterocysts. The latter have a very varying length; they are 2-5 times as long as thick. Known from Europe, North America, Bolivia, Australia (Berggren)."

Hab.: Glasshouse Mountains, *Dr. Thos. L. Bancroft.*
(Plate XI., Fig. 9.)

NOSTOC, Vauch.

Larger and smaller *Nostoc* colonies were collected at different places, but it is not possible for me to determine them, since the spores are wanting. A specimen which forms thick skin-like layers a centimetre in size, of very irregular shape, with entire or lobed margins.

N. Linckia (*Roth.*), *Born. and Thur.* Cooke's British Freshwater, Algæ, 227. Fronds lobed, multipartite, free swimming, as large as a walnut; lobes elongated and anastomosing, ærginous green, at length becoming brownish. Trichomes flexuous, aggregated; joints short and close, spherical or spherical-compressed; sheaths uncoloured, very refractive. Heterocysts slightly oblong. Spores subglobose or oval. Size: Joints, ·0035 mm.; heterocysts, ·005-·006 mm. diam.; spores (in form *intricatum*) subglobose, ·0065 x ·009 mm.—*Cooke l.c.*

Dr. Cooke l.c. gives the following note:—"Forming small roundish gelatinous masses, floating amongst different species of *Lemna* in fresh water, but probably within the influence of the tide, and also amongst *Enteromorpha intestinalis*, and even within the frond in brackish water. The plant is at first of an olive-yellow, gradually

assuming a greenish tint, and when dried of a deep verdigris. Very gelatinous, delicately branched; the branches very flaccid. Under a high magnifier the whole plant is evidently composed of gelatine, in the centre of which runs a single moniliform filament following the ramifications, and in its progress curling to and fro repeatedly across the thread, the joints being nearly globular. The specimens from the interior of *Enteromorpha* are paler, and have longer joints amongst the globular ones."—*Berkeley.*

Prof. Moebius says:—"The dimensions of the vegetative cells (4 μ) and the spherical heterocysts (6-6·5 μ), as well as the thick intwined layer of filaments, would tally with this determination. The species is up to the present time known from Europe and North America."

Hab.: Dalby, Darling Downs; collection, May, 1893, *Dr. Thos. L. Bancroft.*

ANABÆNA, Bory.

Trichomes moniliform, without sheaths (or rarely vaginate), composed of subglobose cells, some of which become changed into globose or elongated spores, usually yellowish-brown or golden-brown. Heterocysts intercalated in the trichomes. Spores originating in cells not adjoining the heterocysts.—Cooke's Freshwater Algæ, 234.

A. flos-aquæ, *Breb.*(?) Free swimming, membranaceous, blue-green. Trichomes more or less curved, often circinate; joints spherical, or from mutual pressure elliptic or quadrate. Heterocysts intercalated. elliptical. Spores globose. Size: Cells ·0045-·006 mm.; heterocysts ·012-·014 mm. long; spores ·008-·01 mm.—*Cooke,* British Freshwater Algæ, 235.

Prof. Moebius gives the following note:—"Vegetative cells 4-5 μ thick; border cells 5 μ thick, 8-10 μ long; spores absent, and on that account the determination is uncertain. Known from Europe and North America."

Hab.: Salt Marsh, Burpengary, May, 1892, Morney Creek, *Dr. Thos. L. Bancroft.*

(Plate XI., Fig. 21.)

NODULARIA, Mertens.

Trichomes distinctly vaginate, with very closely compressed disc-shaped joints, collected in a gelatinous or membranaceous irregularly diffused stratum. Heterocyst intercalated at regular intervals: vegetative joints nearly equal, transversely compressed. Spores fuscous or golden-yellow, becoming tawny, globose, slightly compressed.—Cooke's British Freshwater Algæ, 245.

N. spumigena, *Mertens;* α **genuina,** *Born. and Flah.* Prof. Moebius gives the following note:—"Filaments 11 μ thick; cells $\frac{1}{3}$ broad, $\frac{1}{3}$ as long; border-cells somewhat larger; spores compressed, spherical about 12 μ thick. This species occurs in salt, brackish, and fresh water; and is known from Europe and Australia (Francis)."

Hab.: Freestone Creek, Warwick, on rocks, August, 1893, *Frank Pigram.*

CYLINDROSPERMUM, Kuetz.

Heterocysts terminal, single. Other characters the same as in *Sphærozyga.* Spores originating in cells placed just below the heterocysts.—Cooke's Freshwater Algæ, 243.

C. licheniforme, *Kuetz.* Prof. Moebius gives the following note:—"In small irregular-shaped lavers. Vegetative cells 3-4 μ thick, 4-5 μ long; heterocysts 7 μ thick, 10-14 μ long; spores (single near the heterocysts) 14-16 μ thick, 25-30 μ long. Known from Europe and Brazil."

Hab.: Dalby, Darling Downs; collection, May, 1893, *Dr. Thos. L. Bancroft.*
(Plate XI., Fig. 22.)

MICROCOLEUS, Desmazieres.

Trichomes rigid, articulate, crowded together in bundles, enclosed in a common mucous sheath, either closed or open at the apex; sheath ample, colourless, more or less lamellose, rarely indistinct=*Chthonoblastus*, Kuetz.—Cooke's Freshwater Algæ, 254.

Trichomes enclosed in a transparent sheath from which they emerge to reproduce new filaments; sheath containing several trichomes. Filaments growing in scattered, creeping, erect, or floating wick-like bundles.—*Thur. et Cooke l.c.*

M. tenerrimus, *Gomont.* Prof. Moebius says:—"The sheaths are 20-26 μ thick, colourless and not lamellose, and enclose one, two, or several filaments. The cells are 3-4 μ thick and about double as long, constricted at the septa; the end-cell is pointed. According to Gomont (Monographie des Oscillariées), the filaments are only 1·5-2 μ thick, so that in the Australasian alga a somewhat deviating form is present, which, however, at all events, is to be referred to the known species, with which it also has in common the habitat in salt water. *M. tenerrimus* has been found on the coast of France and Guadeloupe, and upon salt pastures of Bohemia."

Hab: Salt marsh, Burpengary, May, 1892, *Dr. Thos. L. Bancroft.*
(Plate XII., Fig. 5-6.)

M. paludosus (*Kuetz.*), *Gom.* Prof. Moebius says:—"Separate amongst other algæ. Sheath as much as 50 μ thick, divided at the ends, pointed and prolonged beyond the ends of the filaments. Filaments numerously united in one sheath. Cells 5-6 μ thick, usually double as long; end-cell pointed. Known from Europe and North Africa."

Hab.: Glasshouse Mountains, September, 1892, *Dr. Thos. L. Bancroft.*
(Plate XII., Fig. 7-8-9.)

LYNGBYA.

L. æstuarii, *Liebman.* Cooke's British Freshwater Algæ, 258. Trichomes rigid, flexuously curved, blue-green, granular, densely interwoven in dark blue-green tufts; joints 3 to 6 times shorter than their diameter, scarcely constricted; sheaths pellucid hyaline, becoming brownish, at first scarcely lamellose, at length when old becoming distinctly lamellose. Size: Trichomes ·025-·03 mm. diam., without sheath.—*Cooke l.c.*

The following is Prof. Moebius' description:—"Filaments 16 μ thick; cells 12-5 μ thick, $\frac{1}{6}$ as long, not constricted at the septa: end-cell arched. I have not in this instance been able to distinguish a special thickening of the membrane at the end, as Gomont mentions. As occurring inland this species seems hitherto to have been only

observed in Germany and Italy. The other references to its habitat relate to its occurrence on the coasts; in the sea it is extremely widely distributed."

Hab.: Salt marsh, Burpengary, May, 1892 (together with *Microcoleus tenerrimus*), *Dr. Thos. L. Bancroft.*

(Plate XII., Fig. 4.)

L. æruginea-cærulea, *Kuetz.* Prof. Moebius says:—"Forming a flocculent layer upon wood. Filaments 6-5 μ thick, sheath very thin; cells $\frac{1}{2}$-$\frac{1}{3}$ as long as thick, partition-walls indistinct; end-cell with arched external surface. Hitherto only known from France."

Hab.: Georgina River, 1892, *Dr. Thos. L. Bancroft.*

(Plate XII., Fig. 3.)

OSCILLARIA.

O. princeps, *Vaucher.* Stratum æruginous or dark blackish-green, long rayed; trichomes straight or slightly curved, somewhat thinner towards the end.., :pices broadly rounded; articulations one-fourth to one-fifth as long as broad; cell contents steel-blue. Diameter of filaments, 30-45 μ.—Freshwater Algæ of U.S. of Amer., 317.

Prof. Moebius says:—"Filaments regularly 40-42 μ thick, cells 4-6 μ high. It is the same form which Wood treats as a different species under the designation *O. imperator*, but is assigned by Gomont to *O. princeps*. The filaments observed by me show in all respects the same shape of the end of the filament as it has been figured by Gomont. The species is only known from the warmer parts of the earth: Middle and South Europe, Ceylon, Sumatra, Java, Bourbon, the United States of America, Guadeloupe, Brazil."

Hab.: Victoria Park, Brisbane; collection, 3rd September, 1892, *Dr. Thos. L. Bancroft.*

(Plate XII., Fig. 1.)

O. sancta, *Kuetz.* Prof. Moebius gives the following description:—"Filaments, 10-11 μ thick, cells about 2 μ long, end cell rounded, furnished with a calyptra. Known from Europe, North Africa, and South America."

Hab.: Freestone Creek, Warwick, on stones, 1893, *Frank Pigram.*

(Plate XII., Fig. 2.)

MERISMOPEDIUM, Meyen.

M. convolutum, *Rabenh.* Thallus membranous, visible to the unaided eye, more or less folded or convolute; families often composed of 256 geminate cells, arranged in sub-families, sometimes two or three families conjoined with a composite family; cells spherical or oblong. Cytioplasm (cell contents) homogeneous, bluish-green. Diameter of cells, 4-45 μ.—Wolle's Freshwater Algæ of the U.S. of Amer., 326.

Prof. Moebius says:—"The families form larger plates bent round at the margins; these plates may consist of hundreds of cells; one large family measured 100 x 140 μ. The cells are 4-5 μ broad, and the majority in the act of subdivision have a biscuit-like shape. Moreover, all the cells of one large group are divided in the same direction. The spaces between the cells are much narrower than the cells are broad, and between single cells the boundary lines may still be distinguished. I am not aware whether the species has already been found out of Europe. (France and Germany.)"

Hab.: Georgina River, 1892, *Dr. Thos. L. Bancroft.*

(Plate XII., Fig. 10.)

MARINE ALGÆ.

CYANOPHYCEÆ.

COCCOGONEÆ, Thur. CHROOCOCCACEÆ, Rab,

MERISMOPŒDIA, Meyen.

M. revolutiva, *E. Aske.* (n. sp.) Prof. Askenasy first describes this new species in Latin as follows :—"Differt a *Merismopædia convoluta*, Bréb, cellulis minoribus, diametro 3-4 μ, tegumentis gelatinosis. Particulæ sæpe gelatina communi in thallum compositum junctæ." (Differs from *Merismopædia convoluta*, Bréb., in the smaller cells, diameter 3-4 μ, sheaths gelatinous, smaller pieces united into a composite thallus by a common gelatinous envelope.)

He then says :—"This *Merismopædia* occurs in the collected material in the form of larger and smaller pieces. The larger attain a diameter of 1-2 mm., whilst the smaller possess one of only ·3 mm. or less. The larger very irregularly shaped exhibit complexes of smaller pieces, which have separated from each other in the course of development. They fall apart into numerous fragments on slight pressure. The smaller pieces are exactly such separate fragments. These fragments consist of single cell expansions turned inwards at the margin; an actually flat cell-expansion is never found. Their shape is extremely diversified; most frequently they are cylindrical or rather conical bodies, turned up at the margin on both sides anadromously. Sometimes also they are turned up singly in the shape of a paper cornet. The turning up never comprises more than one turn. This accords with the breaking up of the pieces into smaller fragments which continuously ensues as growth advances. This happens because at separate places the growth does not proceed farther in the original expansion, but in a different direction. At these places the portions of the old piece separate from each other, turn in a different direction, but still remain closely united by another portion of the cell-expansion or by the gelatinous investment. Thus it is not uncommon to meet with two cylinders each consisting of a single turn which are yet connected above, but recede from each other below like a pair of legs. By frequent repetitions of the same process are then originated the before described larger complexes.

"The cells of this *Merismopædia* are very regularly arranged in parallel rows in two directions perpendicular to each other. The axis of the revolution is sometimes parallel to one of the directions of the cell-rows, more frequently it forms an angle with it. The cell-walls are always somewhat inflated with gelatinous substance; moreover, the separate pieces are surrounded with a gelatinous envelope. According to the stage of inflation, the cells seen from the surface are more quadrate or more circular. The diameter in this direction amounts to between 3 and 4·5 μ. Inwards (in a radial direction) the cells are lengthened to as much as double their diameter, and are pointed somewhat in the shape of a wedge, the last ones the more so according as the curvature of the expansion is greater.

"*Merismopædia revolutiva* is very nearly related to *M. convoluta*, Bréb., and much of what is said above serves equally for both species. At first, when I had only for comparison the illustration in Kützing's Tab. Phyc. v. 38, as well as the dry material in Rabenhorst's Algæ of Saxony, I believed that the species from Australia now before me was very different from the European. Towards the close of this work, however, I received, through the kindness of Herr R. Lauterborn, living *M. convoluta* from the Old Rhine, near Ludwigshafen, and I then found that this displayed inward curving and shape of the separate pieces in all respects resembling the Australian *Merismopædia*. Nevertheless, there are several characteristic distinctions:—

"In *M. convoluta* the cells seen from the surface are always of quadrate or polygonal form; they lie close together; the cell-walls are not at all or very little inflated with gelatinous substance. The gelatinous envelope, which surrounds whole pieces, in this instance forms only a thin, somewhat compact layer. Futhermore, the cells are considerably larger. In the dry specimens in Rabenhorst's Algæ I found the diameter of the cells in the direction of the surface as much as 5-9 μ, in the living *M. convoluta* from the Rhine 4·5 to 5·5 μ. I also did not find in the latter any complexes of separate pieces as large as in *M. revolutiva*. I therefore believe that this new species may be regarded as sufficiently established. Moreover, the habitat is different, since, so far as I could ascertain, *M. convoluta* has hitherto only been found in fresh water, whilst *M. revolutiva* grows in saltwater swamps."

Hab.: Saltwater swamps between Burpengary and the Caboolture River. (Plate XIII., Fig. 1.)

HORMOGONEÆ, Thur. HOMOCYSTEÆ, Born. et Flah.

LYNGBYEÆ, Kutz.

OSCILLATORIA, Vaucher.

O. nigro-viridis, *Thwaites.* Gomont, Monogr. of the Oscill, p. 237. Prof. Askenasy says:—"Mons. Gomont, of Paris, had the kindness to examine the *Homocysteæ*. He distinguishes by the above name an Oscillatoria, whose cells possess a length of 10-12 μ, and a diameter of about 3 μ. A calyptra is present. Known from the the coasts of Europe and North America."

Hab.: Saltwater swamps between Burpengary and the Caboolture River.

VAGINARIEÆ, Gom.

MICROCOLEUS, Desm.

M. paludosus, *Gom.* Gom. Mongr., p. 96. Prof. Askenasy says:—"The sheaths are pretty firm, in places transversally folded, in old specimens, furnished with an irregular outer margin, and somewhat gelatinous, with foreign particles adhering to them. As many as 10-12 filaments in one sheath, which has a diameter of as much as 40 μ. The separate filaments, pointed at the ends, have a diameter of 5-6 μ The length of the cells amounts to 2-2$\frac{1}{2}$ μ. This plant is mentioned likewise from Moreton Bay, under the name *Microcoleus anguiformis*, Harv., amongst the algæ of the expedition of the 'Gazelle' (exploring cruise of H.M.S. 'Gazelle,' iv. Botany Algæ). I owe the above name to H. Gomont. Since,

however, this species has hitherto only been observed in fresh water, the determination is not altogether certain. *M. paludosus* is known from Europe."

Hab.: Moreton Bay, amongst *Catenella*, *Opuntia*, and other Algæ.

M. tenerrimus, *Gom.* Gom. Monogr., p. 93. Prof. Askenasy remarks:—"The diameter of the filaments amounts to 1-2 μ, the length of the cells double as much. Known from Europe and America."

Hab.: From the same habitat as the foregoing, amongst larger Algæ and sand.

HETEROCYSTEÆ, Born. et Flah.

RIVULARIACEÆ, Rabenh.

CALOTHRIX, Ag.

C. scopulorum, *Ag.* Prof. Askenasy gives the following note:—"This alga is universally distributed. Amongst the same Algæ was found a species of *Anabæna*, which, by reason of the absence of spores, could not be more accurately determined."

CHLOROPHYCEÆ.

CONFERVOIDEÆ, Ag.

ENTEROMORPHA, Link.

E. clathrata, *Ag.* Generally distributed.—*Askenasy.*

Hab.: Moreton Bay and Deception Bay.

CLADOPHORA, Kütz.

C. fertilis, *E. Aske.* (n. sp.) This being a new species, Prof. Askenasy first gives the following Latin description:—"Fila primaria ad 10 cm. longa, flexilia, in fere omnibus cellulis ramos gerentia, ramis oppositis vel ad 3 vel 4 verticillatis; plures rami repetito ramosi, fasciculosi, breviores; pauci filo primario conformes; omnes angulo acuto exeuntes. Cellulæ apicales et illis proximæ 100-150 μ longæ, diametro 10-15 μ; cellulæ adultæ 400-600 μ longæ, diametro 85 μ. Omnes cellulæ juniores zoosporas gerentes, 20 ad 50 in una cellula, quæ ex orificio parvo prope dissepimentum superum sito liberantur." (Primary filaments as much as 10 cm. long, pliable, bearing branches on almost all the cells, branches opposite, or 3 or 4 in a whorl; majority of the branches repeatedly branched, fasciculate, shorter; a few similar to the primary filament; all given off at an acute angle. Apical cells and those adjoining them 100-150 μ long, 10-15 μ in diameter; mature cells 400-600 μ long, 85 μ in diameter. All the younger cells bearing zoospores, 20 to 50 in one cell, which are set free from a small orifice situated near the upper dissepiment.) Prof. Askenasy then says:—"This Cladophora consists of straight flowing filaments as much as 10 cm. long. There is present a distinct main-axis with only a few side-axes of the same shape. The side branches are usually richly branched, but remain shorter and tuft-shaped. The main-axis also terminates in a similar tuft. The branches stand at the upper end, almost one opposite to each cell, or in the form of a whorl, to the number of 3 or 4; in the latter case they are often of unequal age; at the ends of the branches only one side-branch is found on each cell. The branches are pretty straight, and

are given off at sharp angles. At the growing ends occur transverse divisions, principally in the vertical cell, while from this downwards the cells increase pretty regularly in length. In the older part of the filament the cells subdivide by continuous longitudinal growth, also not infrequently intercalary, as may be observed from the condition of the transverse walls; intercalary branch-formation is also found in this case. The end-cells are 100-150 μ long, with a diameter of 10-16 μ. Then the thickness of the filament increases to about 5 mm. from the point where the cells have a length of 100-300 μ, with a diameter of 60-70 μ; moreover, both dimensions only vary slightly; thus the oldest cells of a piece of filament 400-600 μ long, had a length of 400-600 μ and a diameter of as much as 85 μ. The cells are perfectly cylindrical; the longitudinal and transverse walls, even in the oldest cells, only moderately thickened. The transverse walls display the characteristic that the innermost layer is considerably inflated, so that the partition-wall is arched forward, above and below, into the interior of the cell. Only a few scattered starch granules are to be found. Especially characteristic of this Cladophora is a very abundant formation of swarmspores. The swarmspores are only produced in the thin cells (up to a diameter of 30 μ) of the tufts of branches; they are fairly large, and as many as 20-50 are originated in one cell. They are discharged through a small lateral ostiole situated near the upper partition-wall. The empty cells in Figs. 4 and 5 of Plate 1 are such as have discharged swarmspores. Germinating swarmspores are found abundantly on the filaments of the alga. They have a small adhesive disc, and are developed into thin branched sprouts like the branch-tufts of the older plants. The *Cl. fertilis* belongs to the tribe *Eucladophora* (Kütz.) Hauck, subdivision *D. Crystallinæ*, De Toni (Sylloge Algarum, vol. 1, p. 318)."

Hab.: Deception Bay.
(Plate XIV., Figs. 1 and 2.)

SIPHONEÆ.

ACETABULARIA, Lamx.

A. calyculus, *Quoy et Gaim.* Professor Askenasy says:—

"The species *Acetabularia* has been recapitulated and investigated, by different enquirers. The majority have had before them *A. mediterranea*, Lamour. In the latest work of Cramer (upon the verticillate Siphoneæ, Denkschr. d. schweiz naturf. Ges. Bd. 30), in which the older literature is also to be found, *A. crenulata*, Lamour, is in addition more accurately described. In Agardh (Till Alg. Syst. VIII. Siphoneæ) some portions of the Australian *Acet. Kilneri*, J. Ag., are to be found figured. *A. calyculus* has hitherto received little consideration. What we know about it is principally due to Harvey, who, in the Phycologia Australis, Pl. 249, has given a very good illustration and short description of this species.

"The specimens of *A. calyculus* forwarded to me were fastened to mussel-shells. By dissolving these in acid I was able to ascertain that in this species (just as, according to De Bary, is the case in *A. mediterranea*) an apparently perennial basal-piece is present hidden in the substratum. This species, from the manner in which the stalk is attached to it, makes it seem probable to me that here also new stalked discs originate. Thickly above the upper surface of the substratum

tenacious fibres arise from the stipe, which serve to fasten it more thoroughly to the under-layer. The length of the stipe is as much as 35 mm.; in transverse section it amounts to about 22 mm. As in the other species so also in *A. calyculus*, the stipe bears at certain distances whorls of hairs, which consist of 10-14 hairs arranged in a whorl; these are as a whole 2-4 mm. long and 4-5 times polytomously branched, whereby a hair at times bears at the upper end 3-4 new hair-like shoots. They are very perishable, so that in specimens with developed pileus or disc generally only one whorl of hairs is found immediately under the disc, rarely an older whorl is found lower down.

"At the point of attachment of the hairs, the considerably thickened wall of the stipe is interrupted by a dot, from which it perhaps follows that the hairs are not without significance in the nourishment of the plant. After the falling off of the hairs the point of attachment is still at first clearly visible, but afterwards it becomes gradually obliterated by the casting off of the membrane. The distance from each other of the whorls of hairs amounts to 1-1·5 mm.; only the uppermost approaches the disc to within 0·5 mm. The diameter of the stipe is greater above than at the base, and at the point of attachment of the whorls of hairs greater than between these. I thus found the diameter of the stipe by transverse section at the base about 180 μ, in the upper part 250-300 μ. The cell-wall of the stipe is greatly thickened; its thickness amounts to 60 μ. The pileus or disc is more or less concave at the surface; spread out it has a diameter of as much as 5 mm.; in section in the present specimens 3·5 μ, but it decreases to 1 mm. The number of the rays amounts to 25-30; their breadth at the margin 350-450 μ, in the centre about 90 μ. The rays, particularly at the margin, are thin-walled, as in *A. crenulata*. They do not, however, as in the latter proceed to a point, but seen from above are cut off straight at their end, generally also at the middle somewhat bulged (see Pl. XIII., Fig. 2). The angles at the edge of the rays are somewhat rounded, so that frequently the greatest diameter of the ray lies not at the outermost edge but a little within it. The rays are also somewhat rounded at their ends in the direction perpendicular to the surface of the disc. At the edge the separate rays of the disc are already at an early stage divided from each other by a cleft, more or less wide, proceeding inwards. In older discs they generally become wholly disjoined from their neighbours, and then stand in irregular arrangement beside and over each other.

"The spores are perfectly spherical. According to several computations there are 30-50 of them in one ray of the disc (Harvey's illustration shows a considerably greater number). They are generally of pretty equal size, with a diameter of 90-120 μ. Only at the base of the rays they are often found larger, as much as 200 μ in diameter, which, perhaps, is connected with the mode of their formation.

"Moreover, in *A. calyculus*, we find at the base of the disc rows of projections like collars, one inner and two outer. The shape of these collars may be made out from the sketches, Plate XIII., Figs. 2*a*, 2*b*, 2*c*, of which Fig. 2*a* represents a partial view of the central portion of the disc seen from beneath or on the outside; Fig. 2*b* a longitudinal section through an older disc at the point where the disc-rays are inserted in the stipe; finally, Fig. 2*c* represents part of a longitudinal section at the same spot through a younger disc. Figs. 2*a*

and 2*b* are magnified about 60 diameters; Fig. 3, 90 diameters. The inner and the upper outer collar form a sort of vestibule through which the rays of the disc are connected with the stipe. Moreover, I desire to lay particular stress upon the fact that as well towards the stipe as towards the ray of the pileus the entrance to the vestibule is greatly narrowed by a folding in of the membranes (see Figs. 2 and 3), as Nægeli has already represented it for *A. mediterranea*. The inner collar bears upon its downward slope hairs standing 3, or more rarely only 2, in a row. Of these hairs the uppermost is the youngest. They are, when full grown, formed in all respects similar to the filaments of the whorl of hairs of the stipe. Fig. 2*c* is taken from a very young pileus, in which the two upper hairs are first in development. The upper, outer collar (see Fig. 2*a*) is flat towards the top, or slightly turned up at the edges, never doubly indented, as, according to Cramer, it is in *A. crenulata*. In the middle is sometimes seen a sort of cross-border, which Cramer also mentions for *A. crenulata*. Since, likewise, many collar-cavities are somewhat folded in at the middle of their outer walls, and here also are more strongly thickened, this thickening of the cell-wall, combined with the folding, gives the impression of a border or transverse wall. The upper and under outer collars are not in our *Acetabularia* separated by a furrow, but lie directly one upon the other, only a slight cleft in the middle of the intervening wall sometimes indicates a division. The under outer collar has walls particularly strongly thickened.

"Amongst thirty specimens of our *Acetabularia* examined, one was found with two discs, one following the other, which were separated by a whorl of fibres. In another, I found the point of attachment of an old disc separated by several whorls of fibres from the normally formed upper disc. Hence, perhaps, the repeated formation of discs in *A. calyculus* occurs only exceptionally. The cell-wall of this species is only slightly incrusted with carbonate of lime. In the interior of the stipe and disc of the specimens examined were found large spherical crystals of inulin. Starch is found in the shape of small granules in the disc-rays, and especially abundant in the young spores.

"Amongst the mounts made by Dr. Bancroft and forwarded to me there was likewise one which contained a young specimen of *Acetabularia calyculus* (before the formation of the disc). The upper end of this specimen is shown in Plate XIII., Fig. 3. It is here seen that the shoot bears several whorls of fibres, which are in all respects of the same nature as those in disc-bearing specimens, and that it proceeds to a thin point, which unfortunately does not come out quite clearly in the figure. The development of *Acetabularia* has been precisely described by Dr. Bary for *A. mediterranea*. From what has been here stated it follows that in our *Acetabularia* it proceeds in exactly the same manner. I, moreover, particularly draw attention to the great resemblance which the vertex of *Dasycladus occidentalis* (according to the illustration of Cramer, in his work above mentioned, Plate V., Fig. 2) shows to the young form of *Acetabularia* here represented.

"The specimens of *A. calyculus* which Quoy and Gaimard and Harvey described were obtained from Western Australia. According to Dickie, this plant also appears to occur in the island of Mauritius."

Hab.: Deception Bay.

(Plate XIII., Figs. 2, 2*a*, 2*b*, 2*c*, 3.)

PHÆOPHYCEÆ.

PHÆOSPORÆ.

ECTOCARPUS, Lyng.

E. indicus, *Sonder.* Prof. Askenasy says:—"Amongst the Algæ which were collected on the voyage of exploration of H.M.S. 'Gazelle' was this *Ectocarpus*, growing upon sargassum from Moreton Bay, and I have described it as *F. pumila* (s. 19 of Sep-abdr.) In the present material it was present more abundantly and in more vigorous specimens, and I can now complete the remarks which I there made."

E. indicus occurred likewise, adhering to the stalk of *Acetabularia.* Creeping, branched filaments lying near each other, twisted many times in all directions, grow thickly attached to the substratum. From the middle of their cells spring branches, which grow further at right angles to the substratum; these are the characteristic vegetative filaments. Moreover, the end of a creeping filament may grow into an upright filament. These upright filaments are 2 cm. long, pliable, floating to and fro.

The branching is generally monopodial, so that a main-axis is often to be discerned taking a course irregular and in all directions. Several branch-forming cells generally follow each other, and then a longer row of branchless cells. Sometimes at the base of a branch may be distinguished a series of continuous rapid cell-division, but generally the cell-division is intercalary and lasts a long time.

All the branches are prolonged into hairs, which often attain a very appreciable length, whilst new cells of the filament are constantly elongating, losing their contents, and becoming hair-cells. (See the illustration Plate XIV., Fig. 4.) Likewise towards the end of the main-axis, the formation of hairs on the branches becomes very considerable. Thus here, for example, a branch of 1·5 mm. in length consists of only as much as 0·3 mm. of cells with contents, whilst beyond that follows a hair 1·2 mm. long. The diameter of the branch at the base was 20 μ, whilst the hair diminished from 15 μ in diameter to 5 μ at the point; it is, therefore, terminated in a point. The hairs are in the upper part attached to young branches, which extend to a very thin point. They can in this way be easily distinguished in our species from the young sporangia, which always terminate abruptly. The number of cells of the hair, as well as their diameter, is increased by continnous growth from the base, while frequently the upper thin cells fall away. The branched hairs which are sometimes met with are also accounted for by the conversion of the vegetative cells into hair-cells.

The rhizoids are only very slightly developed; they are found as extremely short filaments at the base of older branches, which are thereby more firmly attached to the main stem. The chromatophores have the shape of small granules, and are present in considerable number in every cell. The cells always remain thin-walled, a clear proof that the filaments have a life of no long duration. The length of the vegetative cells certainly increase in longitudinal section from the ends of the shoots towards the base; but in consequence of the rather irregular active intercalary cell-division, extremely short cells are also often found in the old portions of shoots. On the ends of the shoots the cells are, according to the form of the branches, 15-50 μ

long, whilst in the older portions they become as much as 140 μ long. The hair-cells may be very long, as much as 140 μ, with a diameter of only 5 μ. The diameter of the filaments proper increases rapidly at first, but afterwards remains stationary; in the youngest cells it amounts to 10-20 μ, and reaches in the oldest as much as 40 μ. In the plurilocular sporangia may be distinguished two forms different in shape and length. In the more vigorous filaments is found the form which is represented in Plate XIV., Fig. 3-4. These sporangia are regularly cylindrical, terminating obtusely at the upper end, 50-130 μ (in section 90 μ) long, and of a diameter of 15-30 μ (in section 20 μ). The average number of horizontal dissepiments in the sporangium amounts to 12, so that one compartment is about 7 μ high; this is, therefore, also the height of a single loculament of spores, which in section is somewhat quadrate. The sporangia of the second form, which occur mostly in the thinner filaments, and are shown in Plate XIV., Fig. 5, are attenuated in the upper part somewhat in the form of a cone, but they terminate obtusely. They have a length of 45-55 μ, with a diameter of 15-20 μ. The height of a loculament amounts in section to 7 μ. *E. indicus* is so far known from Molucca and the Fiji Islands.

Hab.: Deception Bay.
(Plate XIV., Figs. 3, 4, 5.)

E. siliculosus, *Dillw.*, **var.** Prof. Askenasy says:—"I have denoted this *Ectocarpus* in accordance with the condition of the chromatophores and the shape of the sporangia as *E. siliculosus*. An accurate comparison with the different forms of *E. siliculosus* may be reserved until later. The filaments are as much as 3 cm. long. The branching is pseudo-dichotomous, irregular, but so that between every dichotomy there lie a number of cells without branches. The number of cells of these internodes considerably increases from the point of the shoots towards the base; at the former they amount to 4-8 cells in consequence of active intercalary cell-division, and since branches of normal condition are only formed in young portions. The older internodes, therefore, have a length of as many as 170 cells. The branches as well as the sporangia are, while young, pointed at the ends. Older branches are extended at the ends into hairs, consisting of small considerably lengthened cells. The hairs are never so long as in *E. indicus*. At the furcations are sometimes seen very minute beginnings of rhizoids. In each cell is found a chromatophore in the shape of a branched plate. Older cells are very seldom divided by a central longitudinal wall. In older portions the lateral walls are considerably thickened, whilst the dissepiments in the long-continued intercalary subdivision are usually very thin-walled. The lateral wall may be 5 times as thick as the transverse wall. The cells of the youngest portions of the filament are 15-25 μ long, with a diameter of 10-20 μ. Towards the older portions the diameter as well as the length of the cells increases, but the latter, in consequence of the long-continued intercalary subdivision, not very conspicuously, so that in older portions the cells are just about as long as thick. I found them here in one instance 30 μ long, with a diameter of 35 μ; on another occasion 35 μ long, with a diameter of 30 μ.

"The plurilocular sporangia are usually sessile, more rarely stalked, generally cylindrical or somewhat attenuated, extended all at once at the point into a thin 5-10 celled hair. Exceptionally it happens that separate cells of the sporangium—for example, middle or even upper—remain vegetative. Moreover, actual intercalary sporangia occur where, after the formation of the sporangium, the top cells are developed into a growing, branch-forming thread. Yet this is seldom the case.

"The normally developed sporangia are 100-300 μ, in section 200 μ, long. The greatest diameter varies much less. It lies between 15 and 25 μ; in section it is about 20 μ. The average height of a compartment amounts to 5 μ. The hair at the end of the sporangium may be as much as 500 μ long. Very different to these normal sporangia are those which are found upon very old portions of the filaments, and which I will call adventitious sporangia, since they bear a very strong resemblance to the adventitious branches which occur in the same portions of the filaments. Likewise these do not stand at the anterior end of the cell at a sharp angle, but latterly in the middle at right angles to the lateral wall. They are short and cylindrical or somewhat conical, and terminate bluntly, without hair. They are on an average only 35-50 μ long, with a diameter of 20 μ."

E. siliculosus appears to be generally distributed.

Hab.: Moreton Bay; also Burpengary Creek.
(Plate XV., Fig. 2.)

E. simpliciusculus, *Ag.*, **var. vitiensis.** Prof. Askenasy remarks:—"The present specimens from Moreton Bay agree exactly with those described by me amongst the algæ of the 'Gazelle' (ubi sup.) from the Vavau Island. I may therefore be brief in this place, and refer to that work for fuller information.

"The filaments attain 3 mm. in length. The diameter of the whole filament remains almost equal from the point to the base (15-25 μ). The length of the cells is at the growing-point about 10 μ, in older portions as much as 75 μ. The branches are thinner, the formation of branches very meagre. The chromatophores are found as small granules in considerable numbers in each cell. The plurilocular sporangia usually sessile, somewhat conical, are in section 85 μ long, with a diameter of 25 μ; the height of the loculaments amounts to 7 μ.

"Moreover, I found besides one filament, which was converted for a very considerable length into a plurilocular intercalary sporangium. Plate XV., Fig. 1, represents this filament, unfortunately somewhat distorted."

This variety is hitherto known from Oceania, the principal form from Europe.

Hab.: Moreton Bay.
(Plate XIV., Fig. 6; Plate XV., Fig. 1.)

FLORIDEÆ. GIGARTININÆ, Schmitz.
RHODOPHYLLIDACEÆ, Schmitz.
CATENELLA, Grev.

C. opuntia, *Grev.* Prof. Askenasy gives the following note:—"See Harvey, Phycologia Australis, Pl. 296. Our specimens had tetrasporangia."

This alga is so far known from South Australia, New Zealand, and Europe.

Hab.: Moreton Bay.

RHODYMENINÆ, Schmitz. SPHÆROCOCEACEÆ, Schmitz.

HYPNEA, Lamx.

H. divaricata, *Grev.* Prof. Askenasy's note is a reference to Harvey, Phyc. Austr. Cat., Kütz. Tab. Phyc. XVIII., Pl. 25. (See "Gazelle" Algæ, s. 46.)

Hab.: Moreton Bay.

CERAMIACEÆ, Schmitz.

CALLITHAMNION, Lyng.

C. corymbosum (Engl. Bot.), *Lyngbye,* **var. australis.**

Prof. Askenasy says:—"This *Callithamnion* was partly attached to the stalk of the *Acetabularia calyculus.* The thallus attained a length of 2 cm., consisting throughout of branched cell-filaments, without any cortical layer. This branching is (pseudo)-dichotomous, so that almost every cell bears two branches at its end, yet the branches are often unequally developed, on which account the whole plant has not such a regularly branched appearance as in the Plates 33-35 of the 'Etudes Phycologiques' of Thuret and Bornet, to which I particularly refer for further information. The apical cells often bear hairs, without their growth and subdivision being in any way affected thereby. The hairs easily fall off. The formation of branches as well as subdivision by transverse walls takes place as a rule only in the apical cell. The branches originate as lateral shoots, but soon become as stout as the main shoot. Sometimes, also, the branches are first formed in older cells. The cells separated from the apical cell by plain walls then grow longitudinally, very rapidly up to about the fourth cell, after that very slowly. They always attain a length of 250 μ. Thus I found in one branch the apical cell 13 μ long, with a diameter of 10 μ; the fourth cell from the apex was 62 μ long and 15 μ in diameter; the twentieth (longest) 165 μ, with a diameter of 27 μ; whilst the cell of the filament from which the branch proceeded possessed a length of 250 μ and a diameter of 60 μ. With regard to the diameter, it is further to be noticed that the wall in the specimens examined was very much inflated; in the 20th cell half the diameter was made up of the inflated membrane (collode), and in the last noticed of 60 μ diameter; the cell-cavity comprised 20 μ, and the thick cell-wall 40 μ. The tetrasporangia subdivided into tetrahedra (see Plate XVI., Fig. 41), on an average 40 μ in diameter, were present in the Australian specimens in somewhat scantier numbers than in those figured in the 'Etudes Phycologiques.' On the other hand, the specimens with cystocarps (Plate XVI., Fig. 2) and antheridia (Plate XVI., Fig. 3) agree in all respects with the figures given in that work. On the whole this variety differs only slightly from the European form. The specimens are certainly much smaller, yet since they were only accidentally collected with other forms, it is possible that in Australia also there may grow specimens which attain the dimensions of the European."

Callith. corymbosum is known from Europe and North America.

Hab.: Deception Bay.
(Plate XVI., Figs. 1, 2, 3.)

C. corymbosum, *Lyngb.* **(f. monospora).** Prof. Askenasy says:—"With the foregoing I received, but only in a few specimens, a form bearing monospores, which is pretty similar to Harvey's *Corynospora australis* (Phycol. Austral., Pl. 253). Only the monospores are differently placed—viz., always beneath the furcation (see Plate XV., Fig. 6). Moreover the whole plant is manifestly less stout, and it may consequently perhaps tally better with *Corynospora gracilis*, Harvey (Phyc. Austr., Cat. s. 50). Nevertheless in its vegetative portions this agrees so completely with the tetrasporangia-bearing *Callith. corymbosum* before described, that I consider it best to class it with the latter. Absolute certainty as to the proper classification of both can perhaps only be attained by observations on the spot. It might perhaps also be thought that the monospores are merely undeveloped tetraspores; this, however, is contradicted by their somewhat different shape, as well as by the circumstance that they often occur in very great number in one specimen, without tetraspores being found in the same, whilst the latter are to be observed as a rule in the same object in very different stages of development. These monospores have a somewhat club-like shape tapering downward. They are in section about 12 μ long and 6 μ in diameter. By looking at Plate XV., Fig. 6, the cell-nucleus will often be very clearly perceived in them as well as the plasmic connections with the support-cells, the latter, perhaps, a proof that they are not yet quite ripe."

Hab.: Deception Bay.
(Plate XV., Figs. 5-6.)

SPYRIDIA, Harv.

S. filamentosa (*Wulfen*), *Harvey.* Prof. Askenasy's note:—"Generally distributed."

Hab.: Moreton Bay.

CERAMIUM, Ag.

C. pygmæum ? *Kütz.* Prof. Askenasy's note:—"See the remarks in the 'Gazelle' Algæ, s. 39. Known from mid-ocean."

Hab.: Moreton Bay and Deception Bay.

RODOMELACEÆ, Schmitz.

POLYSIPHONIA.

P. mollis ? *Hooker f. et Harv.*

Prof. Askenasy says:—"I have described this *Polysiphonia*, very abundant, as it seems, on the coasts of Australia (I received it also from Adelaide) amongst the Algæ of the 'Gazelle,' s. 50, under the name *P. havannensis*, Mont. Now by comparison with specimens of *P. tongatensis*, Harv., which I possess from New Caledonia, and which, according to J. Ag. Sp. Alg., s. 968, is very likely identical with *P. mollis*, Harv., I believe that it is better to denote it by the above name. A sure determination will only be possible by comparison with the original specimens of *P. mollis*. Some additions and corrections to the remarks in the algæ of the 'Gazelle' may here find a place."

P. mollis, Harv., belongs to the Polysiphoniæ, always uncorticulate, with four pericentral cells. The transverse section is circular or slightly quadrangular. On the shoots stand dichotomously branched hairs as much as 0·4 mm. long; they are at an early stage colourless,

and generally soon fall off; more rarely they persist also in the older portions. Every joint bears such a hair at the upper transverse wall, at the margin between two pericentral cells. Therefore these also stand in regular $\frac{1}{4}$-arrangement. In falling off they each leave behind an extremely short basal cell with coloured contents, and not extending above the pericentral cells. From this originate the normal branches. They proceed in the most various directions, and are attached in small number at irregular intervals, so that long internodes of 6-18 and more cells alternately occur. The branches may be repeatedly branched. A distinct main axis is not present. The cell-walls are somewhat inclined to swell.

The following short table gives information with regard to the length and diameter of the joints:—

	Length.	Diameter.
	μ	μ
Apical cell	10 ...	9
6 joint from the top ...	4 ...	12
10 „ „ „ ...	5 ...	15
15 „ „ „ ...	12 ...	23
23 „ „ „ ...	40 ...	34

From this point the joints increase in length and diameter only very slowly, as may be observed from the following table of lengths and diameters:—

Distance from Apex.		Length.		Diameter.
mm.		μ		μ
0·08	...	8	...	20
0·16	...	12	...	27
0·24	...	16	...	40
0·41	...	40	...	53
0·7	...	62	...	52
1·7	...	92	...	61
2·5	...	105	...	67
5·0	...	160	...	72
8·2	...	180	...	73
12·0	...	183	...	76

It is seen that here the diameter of the joint is at first greater than the length. Further on, the growth of the diameter almost ceases, whilst the longitudinal growth still continues, and the joints become 2-3 times as long as thick; yet this is not necessarily the case: the growth of the diameter may also continue longer, as in the before-mentioned case of "The Algæ of the 'Gazelle,'" and the older joints are then as long as thick.

The branches bearing tetraspores (Plate XVI., Figs. 5, 6) are only slightly altered in comparison with the normal, sometimes somewhat bent to and fro, usually almost straight.

The antheridia (Plate XVII., Fig. 1) are seated as a rule on the second cell of a hair, so that their stalk is bicellular, consisting of the short basal-cell, and the first somewhat elongated cell of the hair. In one instance I found on a hair two antheridia—viz., in the specimen represented in Plate XVII., Fig. 1. The portion of the hair above the antheridium easily falls off, but the antheridium itself is also, when it

is ripe, easily set free from its stalk. The antheridium is obtuse at the upper end. The antheridia represented in "The Algæ of the 'Gazelle,'" Plate XI., had not come to perfection.

The cystocarps (Plate XIV., Fig. 4) somewhat differ in shape from those which I have described in "The Algæ of the 'Gazelle.'" They stand upon short, thick stalks, and are about as high as broad. In section I found the stalk about 75 μ long, with a diameter of 25 μ, the capsule about 250 μ high, and 260 μ in diameter.

This *Polysiphonia* seems to me to be nearly related to *P. havannensis*, Mont., and *P. insidiosa*, Cronau, and to be distinguished from them by the scanty, irregular branching and the elongated naked branches. It occurs in Australia and Oceania.

Several algæ from Moreton Bay are noticed in the "Report of the Exploring Voyage of the 'Gazelle.'" With this exception, I am not acquainted with any further remarks upon the algæ flora of that locality. A classification will commend itself as soon as the number of the known forms is somewhat greater.

Hab.: Deception Bay, Moreton Bay, *Dr. Thos. L. Bancroft.*
(Plate XV., Fig. 4; Plate XVI., Fig. 5,6; Plate XVII., Fig. 1.)

Prof. Askenasy adds:—"As an appendix follow two new marine algæ from a collection which was remitted to me for determination through the agency of Dr. Christ, of Basle."

SPHACELARIA.

S. biradiata (n. sp.). Prof. Askenasy first gives the following Latin description:—"Habitu et ramificatione Sphacelariæ cirrhosæ, Roth., vel Sphacelariæ Hystrici, Suhr (Reinke, Sphacelariæ, p. 13) similis, thallus Laurenciæ Tasmanicæ externe adhærens, gemmæ stipitatæ, duobus radiis lanceolatis constitutæ, inter duos radios pilo tenui porrecto instructæ." (In appearance and branching similar to *Sphacelaria cirrhosa*, Roth., or *Sphacelaria Hystrici*, Suhr. [Reinke, Sphacelariæ, p. 13], thallus adhering externally to Laurencia Tasmanica, stalked shoots consisting of two lanceolate rays, between two rays furnished with a slender elongated hair). He then adds:—"The discs of attachment of this *Sphacelaria* are placed upon the outer surface of the thallus of the Laurencia. From these arise several upright axes, which bear as lateral shoots branches, germinating buds, and hairs. The branches are as a rule of the same kind as the main axis; they are irregularly placed, sometimes thickly crowded, sometimes separated widely from each other, lying approximately in one plane. Usually only one branch stands on each joint, rarely two are opposed to each other. The branches originate from out-growth of the cortical cells. Upon transverse section of the filament it is perceived that the peripheral cells do not form a perfect ring—that is to say, the four pericentral cells extend to the outer surface. The hairs proceed by subdivision from the apical cell; they are simple 8-10 celled cell-filaments, soon falling to pieces and perishing. As a rule a hair also originates on every transverse subdivision of the apical cell, which later on is placed horizontally to the partition wall. Several hairs following each other often stand upon the same side of the axis.

"The two-rayed germinating buds particularly characteristic of the species stand upon a 5-8-celled stalk, whose inferior cells are narrow and undivided. Towards the upper part it becomes broader. The

upper cells are divided by longitudinal walls in the manner of the cells of the stem. The two opposed rays are broadest in the middle, tapering away at the base and vertex, but with obtuse ends. Their cells are divided by longitudinal walls, only at the point is found one or several not divided. At the apex of the germinating bud between both the rays stands a thin hair consisting of 15-20 cells.

"The plants before me were as much as 1·5 cm. long. The diameter of the shoots is generally greatest in the middle, and from that point diminishes downwards and upwards, but it is very different according to the nature of the shoots; it lies between 30-60 μ. The simple joints are generally as long or somewhat shorter than the diameter. The stalk of the germinating buds is on an average about 190 μ long, with 55 μ as its greatest diameter. The rays have an average length of 280 μ, with a greatest diameter of 40 μ. I could not find organs of fructification.

"Our species is distinguished from *Sph. furcigera* (Kuetz.), the only Sphacelaria with two-rayed germinating buds known to me, by the lancet-like rays and the central hair; moreover, in *Sph. furcigera* the disc of attachment (according to Reinke) lies in the tissue of the host."

Hab.: Adelaide.
(Plate XV., Fig. 3.)

CALLITHAMNION, Lyng.

C. ovuligerum, *Aske.* (n. sp.) Dr. Askenasy gives the following Latin description:—"Thallus Algis (Laurenciæ Tasmanicæ) affixus, axis filis articulatis, cellulis elongatis, ecorticatis constitutus, ad geniculos ramos conformes vel ramos verticillatos breviarticulatos ferentes, qui ramulos unicellulares oviformes vel ellipsoideos gerunt. Cystocarpia in axibus principalibus terminalia, juniora a ramis subtus natis partim involuta, adultiora nuda e favellis multipartitis constituta. Tetrasporangia tetraedrice divisa, singula sessilia, ad primum geniculum ramorum affixa." (Thallus affixed to algæ [Laurencia Tasmanica] axis made up of jointed filaments, elongated, cells without cortex; branches resembling joints, or bearing verticillate short-pointed branches, which carry unicellular oviform or ellipsoid branchlets. Cystocarps terminal on the principal axes, the younger partly enveloped by branches springing from beneath, the more mature naked and composed of multipartite favelli. Tetrasporangia divided into tetrahedra, single, sessile, affixed to the first joint of the branches.) He then says:—"This alga is affixed by organs of attachment to the Laurencia. On the substratum is found abundantly a creeping jointed filament which bears organs of attachment on the under side, whilst from the opposite proceed numerous upright axes.

"The thallus consists throughout of repeatedly branched cell filaments without cortical layer. The axes are variously developed. Thus we have axes of the first rank with fairly elongated joints of greater diameter, whose lateral branches are of the same nature as themselves, or produce axes of the second or higher rank with more shortened joints. On these, finally, we find axes of the last rank, which merely consist of a unicellular, short, cylindrical, or egg-shaped joint. All the axes display a limited growth. The main axes

terminate in a cystocarp, or they, as well as the axes of the higher rank, are crowned at the vertex by three short cylindrical or egg-shaped cells already noticed above, one of which represents the continuation of the axis, whilst both the others are side-branches. The branches which are becoming new axes of the first rank likewise spring from beneath the cystocarp (see Plate XVII., Fig. 3), where, uniting together in the first place above the young cystocarp, they form a sort of envelope; later on, however, they grow out in a straight line, and often again terminate in cystocarps.

"No sharp lines of demarcation exist between the axes of different ranks; they gradually change one into the other. Originally every joint bears only two opposite side-branches, as may likewise be seen in the young shoots under the cystocarps; later on at the same nodes there spring forth still wider branches, so that whorls of branches are the result (see Plate XVII., Fig. 3). I found rhizoids with organs of attachment only on the axes in the neighbourhood of the substratum; they are short shoots which terminate in a disc-shaped, lamellose cell-expansion composed of short branches lying close together.

"The cystocarps, abundantly present, occupy a terminal position on the axes of the first rank. The favelli consist of a large specially formed complex of spores, at the base of which others afterwards shoot out. Those figured in Plate XVII., Figs. 2 and 3, are both very young.

"The tetrasporangia (Plate XVI., Fig. 4) are subdivided into tetrahedra; they are usually placed singly on the first joint cells of the secondary branches, sometimes also on the branchlets which proceed from these. Unfortunately in my material specimens with tetrasporangia were present only in very small number and in bad preservation. I could not find specimens with antheridia.

"The joints of the stoutest branches were as much as 400 μ long, with a diameter of as much as 120 μ. The joints of the thinner main axes were 100-200 μ long, with a diameter of 20-50 μ. In the branches of higher rank the length and diameter of the cells of the joints then gradually decrease. The short cells, which produce branches of the last rank, are 8-13 μ long, with a diameter of 4-7 μ.

"Prof. Schmitz, who had the kindness to send me some valuable communications upon the subject of this species, as well as upon some other algæ from Adelaide, upon which I shall perhaps report later, writes to me as follows, with regard to their systematic classification:—'The species of *Callithamnion* from Adelaide reminds me very much of *Call. spinescens*, Kuetz. (Tab. Phyc. XI., Plate 88), but I have hitherto seen no authentic material of the latter, so that I hesitate to determine your alga at once as *Call. spinescens*, Kuetz. Then your alga is nearly related to *Call. aculeatum*, Harv., but is not, in my opinion, identical with it; for example, the special formation of the smaller whorl-branchlets, as well as the appearance of the plants in fructification. Furthermore, your alga is in a slight degree related to *Call. Mulleri*, Sond., which J. Agardh. now desires to elevate to the type of a different genus, *Heterothamnion* (see J. Agardh. Analecta algologica Ex. act. Soc. Lundensis, vol. 28, Lund., 1892, pp. 7 and 25).'"

Hab.: Adelaide.
(Plate XVI., Fig. 4; Plate XVII., Figs. 2-3.)

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EXPLANATION OF THE PLATES.

Plate I.—Batrachospermum Dillenii (Bory), Sirdt.

Fig. 1.—A sterile branch.
Fig. 2.—Portion of a young branch, showing a row of 5 central cells, with the little branches at the nodes.
Fig. 3.—Portion of an older branch with 3 cystocarps.
Fig. 4.—Portion of a young branch with the female axis and the young trichogyne *t*.
Fig. 5.—Portion of a young branch: *b*=basal cell of the whorl, *f.a.*=female axis, *t*=trichogyne.
Fig. 6.—Trichogyne.
Fig. 7.—Portion of a complex of antheridies: *s*=spermation, *a*=antheridium evacuated.

Plate II.—Chantransia.

Figs. 1-4, *Ch. pygmæa*, Kütz; Figs. 5, 6, *Ch. subtilis*, n. sp.

Fig. 1.—Fibre of a root covered with the bushels of *Chantransia* (natural size).
Fig. 2.—Creeping filament with 2 erect branches.
Fig. 3.—Portion of the thallus.
Fig. 4.—Branch with sporangium.
Fig. 5.—Creeping and erect filaments.
Fig. 6.—End of an erect filament with hairs and sporangia.

Plate III.—Bulbochæte.

Fig. 1.—*B. gigantea.* Branch of a male plant with androsporangium.
Fig. 2.—*B. gigantea.* Oosgonium with a mature oospore.
Fig. 3.—*B. gigantea.* Branch of a female plant with a young oogonium superposed by a sporangium.
Fig. 4.—*B. gigantea.* Oogonium with numerous nannandria.
Fig. 5.—*B. gigantea.* Oogonium on a nannandrium.
Fig. 6.—*B. gigantea.* Branch of a male plant with androsporangium superposed by a sporangium.
Fig. 7.—*B. setigera.* Branch of a female plant with oogonia (immature) and nannandria.
Fig. 8.—*B. setigera.* Oogonium with mature oospore.
Fig. 9.—*B. setigera.* Branch of a male plant with androsporangium.
Fig. 10.—*B. pygmæa.* Several plants on the cells of *Œdogonium* spec.

Plate IV.—Œdogonium.

Fig. 1.—*Œ. undulatum* with oogonia, androsporangia, and nannandria.
Fig. 1a.—*Œ. undulatum* nannandrium.
Fig. 2.—*Œ. crassiusculum.*
Fig. 3.—*Œ. echinospermum*, Al. Br.
Fig. 4.—*Œ. species incerta.*
Fig. 5.—*Œ. longicolle*, Nordst.
Fig. 6.—*Œ. grande*, Kuetz.
Fig. 7.—*Œ. pachydermatosporum*, Nordst.
Fig. 8.—*Œ. nodulosum*, Wittr.
Fig. 9.—*Œ. Franklinianum*, Wittr.; *a*, oogonium; *b*, antheridium.
Fig. 10.—*Œ. cardiacum* (Hass.), Kütz.; *a*, oogonium; *b*, antheridium.
Fig. 11.—*Œ. fragile*, Wittr.; oogonium and antheridium.
Fig. 12.—*Œ. Pringsheimii* (?).
Fig. 13.—*Œ.* —— spec. (indeterminata).

Plate V.—Chætophora.

Fig. 1—*Ch. tuberculosa.* Portion of the thallus.
Fig. 2.—*Ch. tuberculosa.* Rhizoids.
Figs. 3, 4.—*Ch. punctiformis*, Kütz. Portion of the thallus.
Fig. 5.—*Ch. punctiformis.* Creeping filament.

Plate VI.—Stigeoclonium; Cladophora.

Fig. 1.—*St. protensum.* Habitus.
Figs. 2, 3.—*St. protensum.* Portion of the thallus (more enlarged).
Fig. 4.—*St. protensum.* Portion of the thallus with sporangia (more enlarged).
Fig. 5.—*St. tenue.* Portion of the thallus (above).
Fig. 6.—*St. tenue.* Basal portion of the thallus.
Figs. 7, 8.—*Cladophora parvula.* Branches of the upper portion of the thallus.
Fig. 9.—*Cladophora parvula.* The rhizoid portion of the thallus.

Plate VII.

Figs. 1, 2.—*Trichophilus* spec. (?) 2a. two cells with nuclei and chromatophora.
Figs. 3-6.—*Hormospora transversalis*, Bréb. var. ?
Fig. 7.—*Herposteiron confervicolum*, Næg. On the cell of *Œdogonium crassiusculum*.

Plate VIII.

Fig. 1.—*Coleochæte irregularis*. Portion of the thallus.
Fig. 2.—*Coleochæte divergens*. Young oogonium.
Fig. 3.—*Coleochæte divergens*. Corticated oogonium.
Fig. 4.—*Conferva bombycina*.
Fig. 5.—*Rhizoclonium hieroglyphicum*.
Fig. 6.—*Chætosphæridium Huberi*, n. sp.
Fig. 7.—*Chætosphæridium Huberi*, n. sp.
Fig. 8.—*Pandorina morum*. All cells of the thallus are transformed in partheno-gonidia.
Fig. 9.—*Pediastrum duplex*, Meyen.
Fig. 10.—*Kirchneriella lunaris*, Schmedle.
Fig. 11.—*Scenedesmus bijugatus* (Turp.), Kütz.
Fig. 12.—*Phacus pleuronectes*, Nitzson.
Fig. 13.—*Reinschiella longispina*, n. sp. Three different cells.
Fig. 14.—*Peridinium tabulatum* (containing the list of Austral. Freshwater Algæ from 1892).
Fig. 15.—*Vaucheria sessilis* (Vauch.), DC. Portion of a filament, with antheridium and oogonium.
Fig. 16.—*Vaucheria sessilis*. Oogonium, with mature oospore.

Plate IX.

Fig. 1.—*Spirogyra australensis*, n. sp.
Fig. 2.—*Spirogyra maxima* (Hass.), Wittr., var. *minor*, n. var.
Figs. 3, 4.—*Spirogyra maxima* (Hass.), Wittr., var. *minor*, n. var. Vegetative cells.
Fig. 5.—*Spirogyra nitida* (Dillw.), Linn. (?).
Fig. 6.—*Spirogyra crassa*, Kütz (?).
Fig. 7.—*Spirogyra bellis* (Hass.), Cronau (?). Vegetative cell with gelatinous sheath.
Figs. 8, 9.—*Spirogyra rivularis*, Rabh. (?).
Fig. 10.—*Spirogyra longata* (Vauch.), Ktz. (?).
Fig. 11.—*Zygnema Rhynchonema* (Harvey), De Toni.

Plate X.

Fig. 1.—*Docidium coronulatum*, Grun. Two cells.
Fig. 2.—*Docidium coronulatum*. The ends of two cells.
Fig. 3.—*Gymnozyga moniliformis*, Ehrb.
Fig. 4.—*Desmidium Baileyi* (Ralfs), De By.
Fig. 5.—*Pleurotænium ovatum*, Nordst., var. *inermis*, n. var.
Fig. 6.—*Pleurotænium ovatum*, Nordst., var. *inermis*, n. var. Apex of the cell.
Fig. 7.—*Penium*, spec.
Fig. 8.—*Gonatozygon Ralfsii*, De Bary.
Fig. 9.—*Pleurotæniopsis javanica* (Nordst.), De Toni.
Fig. 10.—*Staurastrum maticum*, Bréb.
Fig. 11.—*Disphinctium cucurbita* (Bréb.), Reinsch.
Fig. 12.—*Pleurotænium Ehrenbergii* (Ralfs), Delp. A half cell.
Fig. 13.—*Closterium lineatum*, Ehrb.
Fig. 14.—*Micrasterias Habahul sharurensis*, Hobs. Half cell.
Fig. 15.—*Xanthidium Smithii*, Arch., var. *variabilis*, Nordst.
Fig. 16.—*Euastrum verrucosum* (Ehrb.), Ralfs, forma. Half cell; *a*, front view; *b*, view from other apex (end view).
Fig. 17.—*Micrasterias decemdentata*, Naeg. Front and end view.
Fig. 18.—*Closterium gracile*.
Fig. 19.—*Cosmarium scrangulare*, Lund.
Fig. 20.—*Cosmarium*, spec. Half cell.
Fig. 21.—*Staurastrum dilatatum*, Ehrb.
Fig. 22.—*Cosmarium Sedgwanum*, Wolle.
Fig. 23.—*Cosmarium obsoletum* (Hautzsch), Reinsch.

Plate XI.

Figs. 1, 2.—*Stigonema hormoides* (Kütz.), Born. et Flah. Form with dur-cells.
Fig. 3.—*Nodularia spumigena*, Mertens, and *genuina*, Born. et Flah.
Fig. 4.—*Nodularia spumigena*. Vegetable cells and heterocyst.
Fig. 5.—*Nodularia spumigena*. Spores.
Fig. 6.—*Microchæte tenera*, Thur., var. *major*, n. var.
Fig. 7.—*Microchæte tenera*. The basal portion of a filament, with two heterocysts.
Fig. 8.—*Microchæte tenera*. The upper end of a filament.

Fig. 9.—*Tolypothrix tenuis*, Kütz.
Figs. 10-17.—*Hapalosiphon pumilus*, Kirchn.
Figs. 10, 11.—The evolution of a branch in a young state.
Figs. 12, 13.—Portion of the thallus, with branches.
Fig. 14.—Portion of the thallus, with a heterocyst.
Figs. 15-19.—*Glœotrichia natans*, Rabentz.
Fig. 15.—The basal portion of a filament: h=heterocyst, sp=spore, s=sheath.
Fig. 16.—The upper end of a filament.
Figs. 17, 18.—Young filaments, with spores in evolution.
Fig. 19.—Older filament, with nearly mature spores.
Fig. 20.—*Sytonema cincinnatum*, Thur.
Fig. 21.—*Anabœna Flos-aquæ*, Bréb. (?)
Fig. 22.—*Cylindospermum licheniforme*, Kütz.

Plate XII.

Fig. 1.—*Oscillaria princeps*, Vauch.
Fig. 2.—*Oscillaria sancta*, Kütz.
Fig. 3.—*Lyngbya œrugineo-cœrulea* (Kütz), Gom.
Fig. 4.—*Lyngbya æstuarii*, Liebm.
Figs. 5, 6.—*Microcoleus tenerrimus*, Gomont.
Figs. 7, 8, 9.—*Microcoleus paludosus* (Kütz), Gom.
Fig. 7.—Thallus.
Fig. 8.—End of a filament, with sheath.
Fig. 9.—Sheath, with several filaments.
Fig. 10.—*Merismopedium convolutum*, Rabentz. Thallus.
Fig. 11.—*Merismopedium convolutum*. A little portion of the thallus; the cells beginning to deal.
Fig. 12.—*Zygogonium tenuissimum*, Grun.

Plate XIII.

Fig. 1.—*Merismopœdia revolutiva*, n. sp., mag. 80.
Fig. 2.—*Acetabularia calyculus*, Harv. Disc with very young spores, to the right a portion of the stipe, mag. 25.
Fig. 2*a*.—(See reference in the text.)
Fig. 2*b*.—(See reference in the text.)
Fig. 2*c*.—(See reference in the text.)
Fig. 3.—Upper portion of a young specimen of *Acetabularia calyculus*, Harv., before the formation of the stipe, mag. 25.

Plate XIV.

Fig. 1.—*Cladophora fertilis*, n. sp., mag. 25.
Fig. 2.—The same, mag. 40.
Fig. 3.—*Ectocarpus indicus*, Sond. Form with cylindrical (pluriloc.) sporangia, mag. 210.
Fig. 4.—The same form, mag. 40.
Fig. 5.—*Ectocarpus indicus*, Sond. Smaller form, with more conical sporangia, mag. 210.
Fig. 6.—*Ectocarpus simpliciusculus*, Ag., var. *vitiensis*, mag. 50.

Plate XV.

Fig. 1.—The same form, with intercalary sporangium.
Fig. 2.—*Ectocarpus siliculosus*, Dillw., var., mag. 40.
Fig. 3.—*Sphacelaria biradiata*, n. sp., mag. 50.
Fig. 4.—*Polysiphonia mollis*, Harv. Cystocarp, mag. 60.
Fig. 5.—*Callithamnion corymbosum*, Lyngb. *Forma monospora*, mag. 60.
Fig. 6.—The same, mag. 280.

Plate XVI.

Fig. 1.—*Callithamnion corymbosum*, Lyngb. With tetrasporangia, mag. 60.
Fig. 2.—The same. Cystocarp, mag. 50.
Fig. 3.—The same, with antheridia, mag. 80.
Fig. 4.—*Callithamnion ovuligerum*, n. sp. Tetrasporangia, mag. 80.
Fig. 5.—*Polysiphonia mollis*, Harv. Tetrasporangia, mag. 40.
Fig. 6.—The same, mag. 25.

Plate XVII.

Fig. 1.—The same. Antheridia, mag. 40.
Fig. 2.—*Callithamnion ovuligerum*, n. sp. Thallus, with a young cystocarp, mag. 50,
Fig. 3.—The same, with very young cystocarp, mag. 50.

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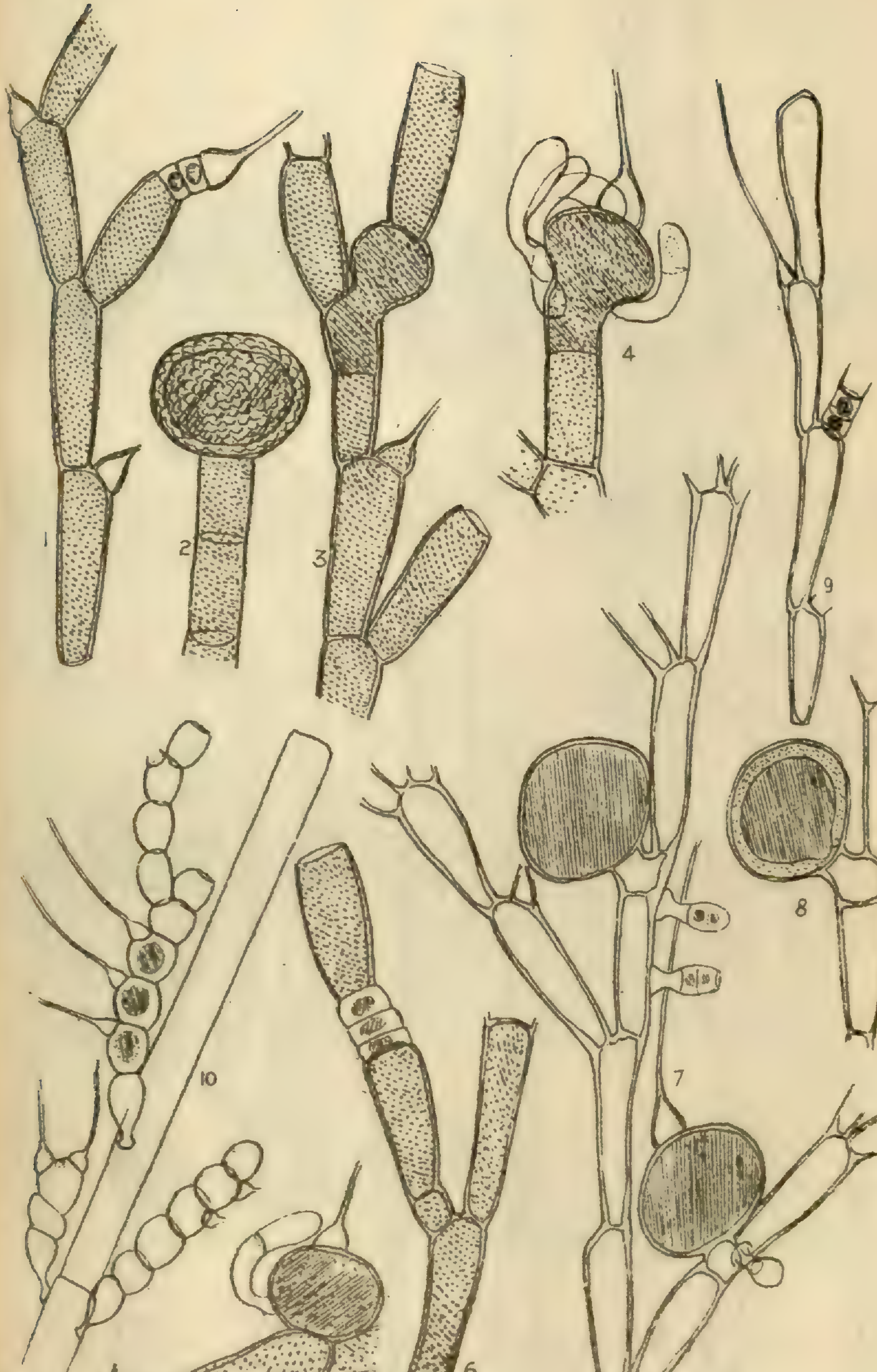
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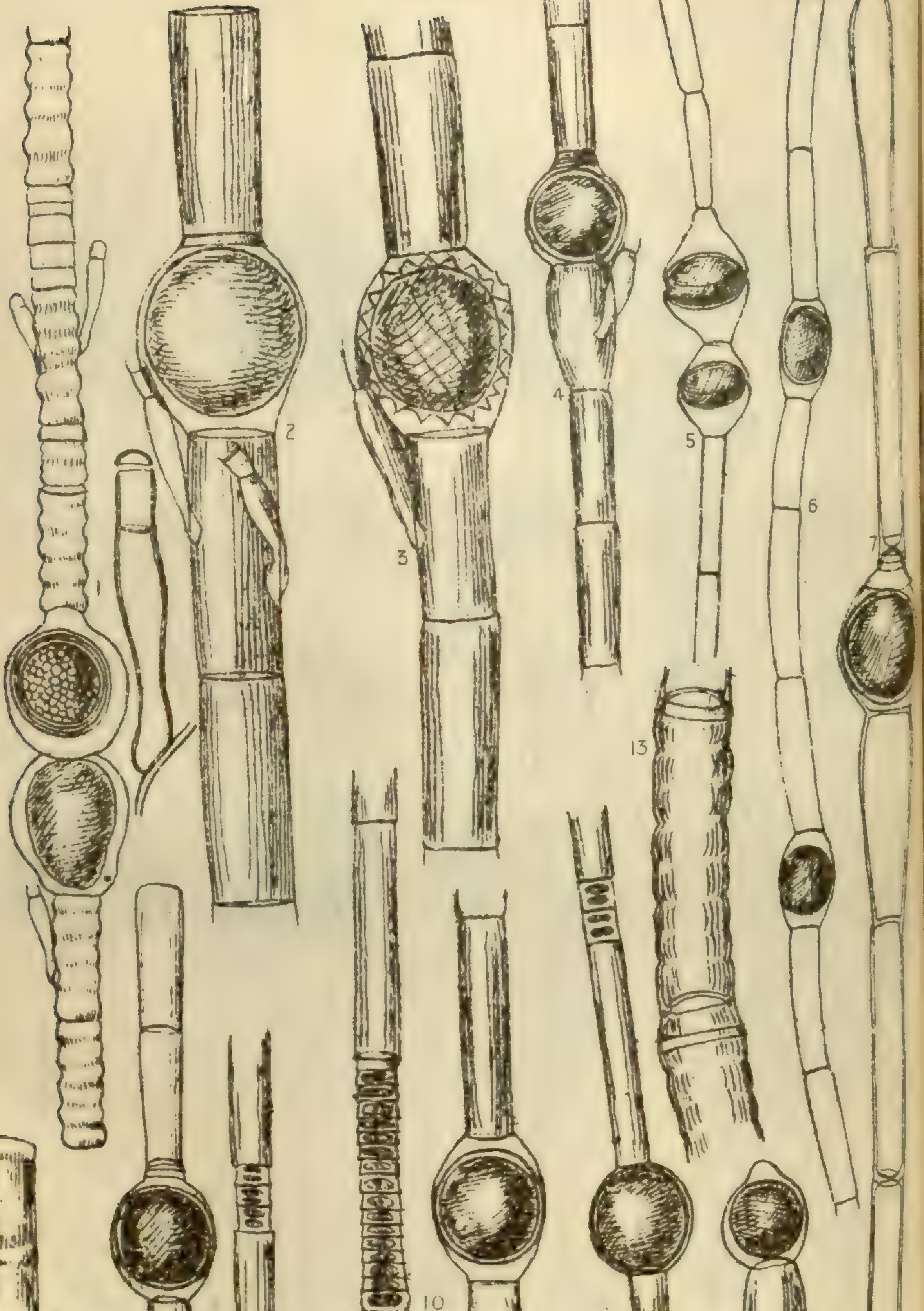

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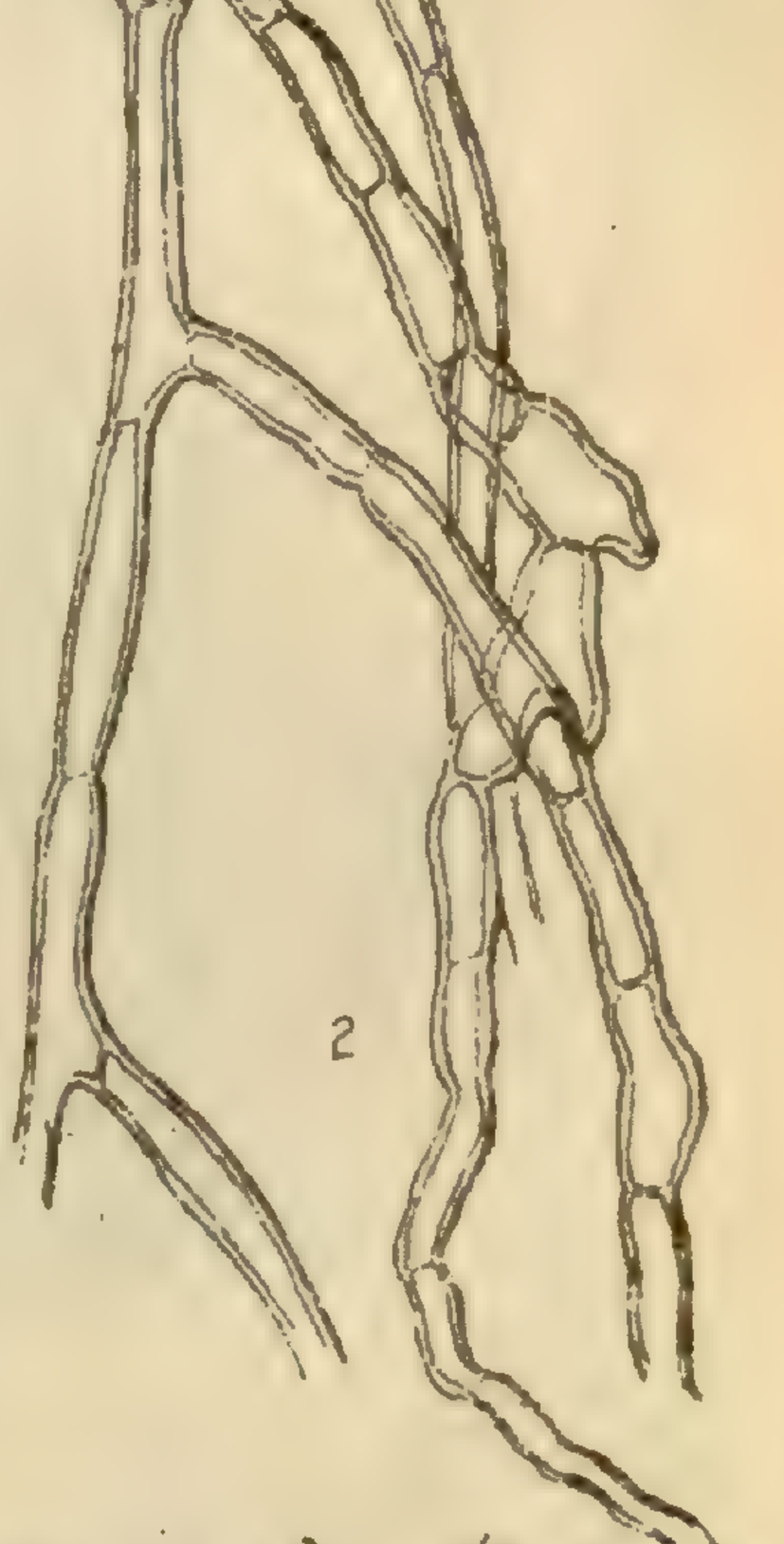

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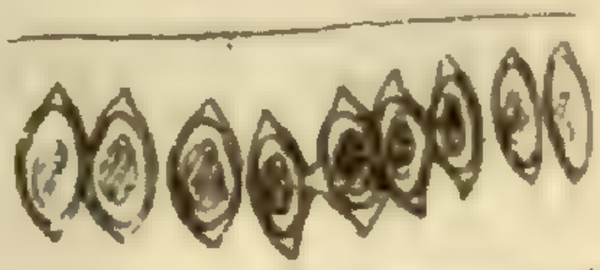

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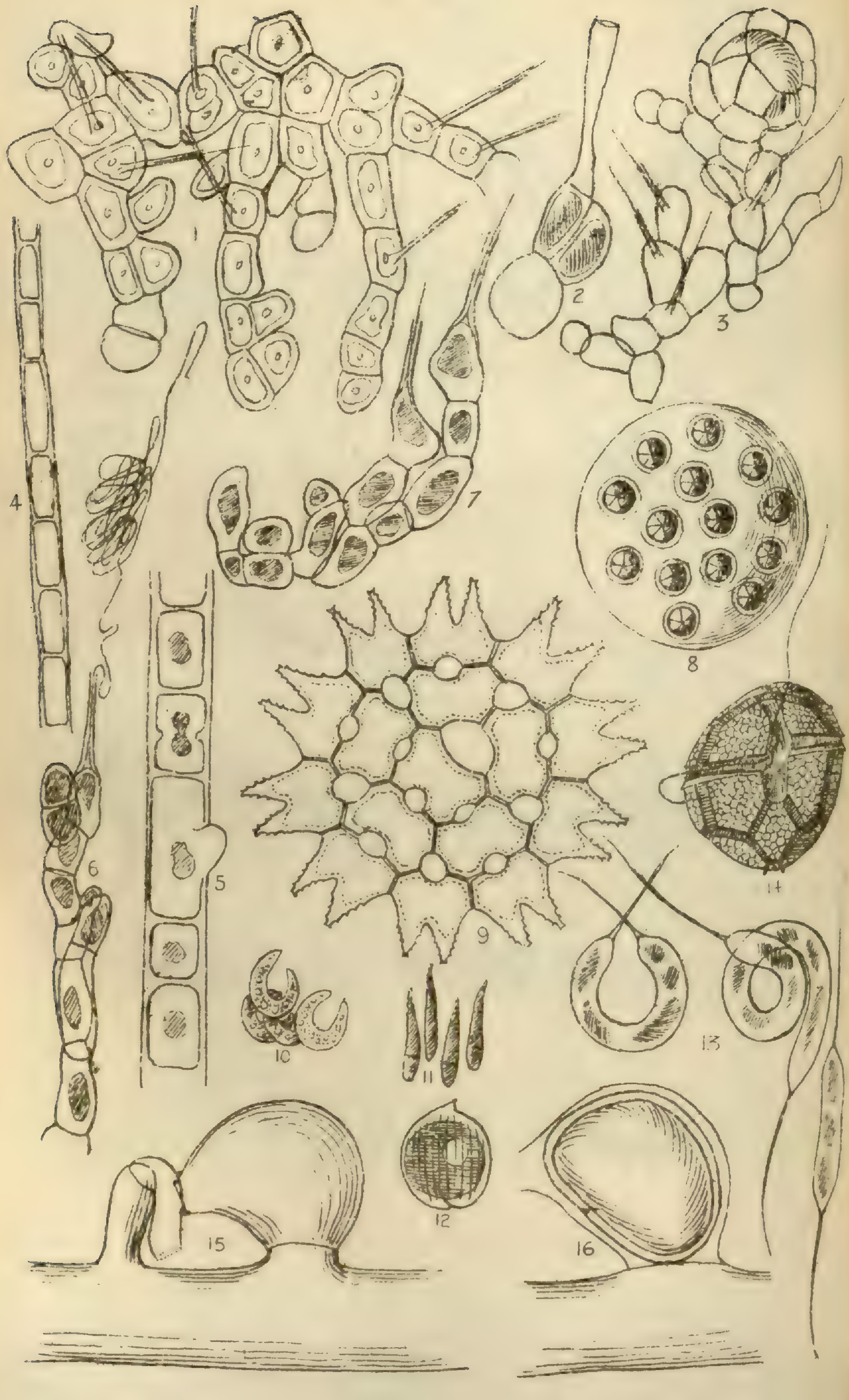
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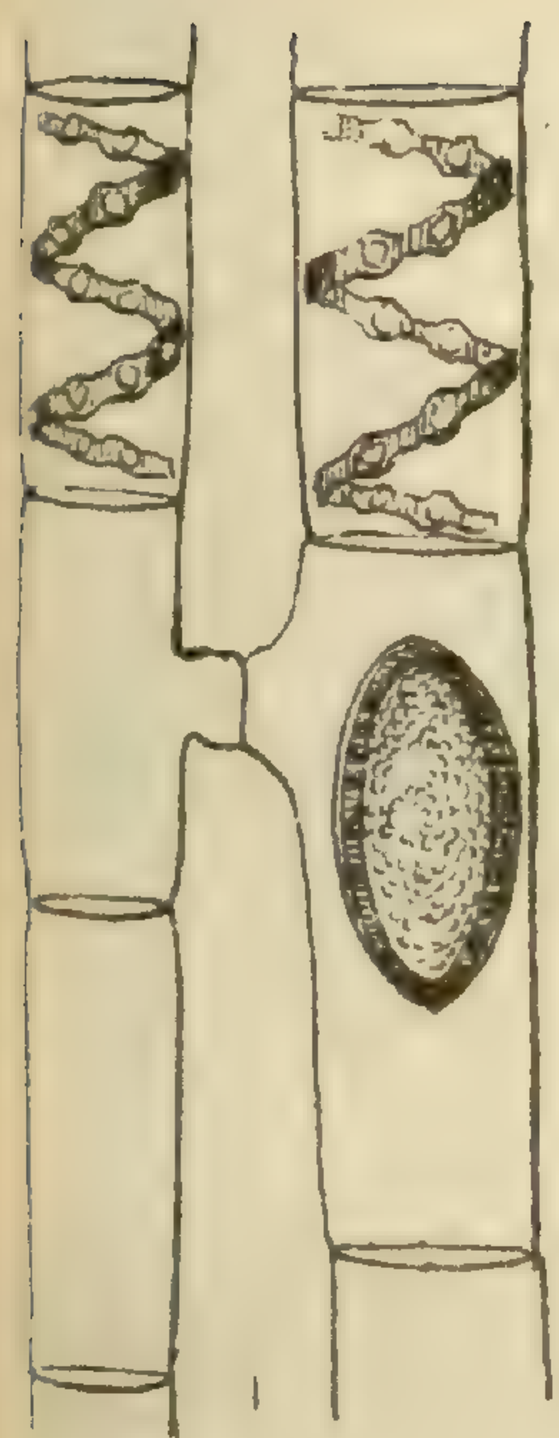

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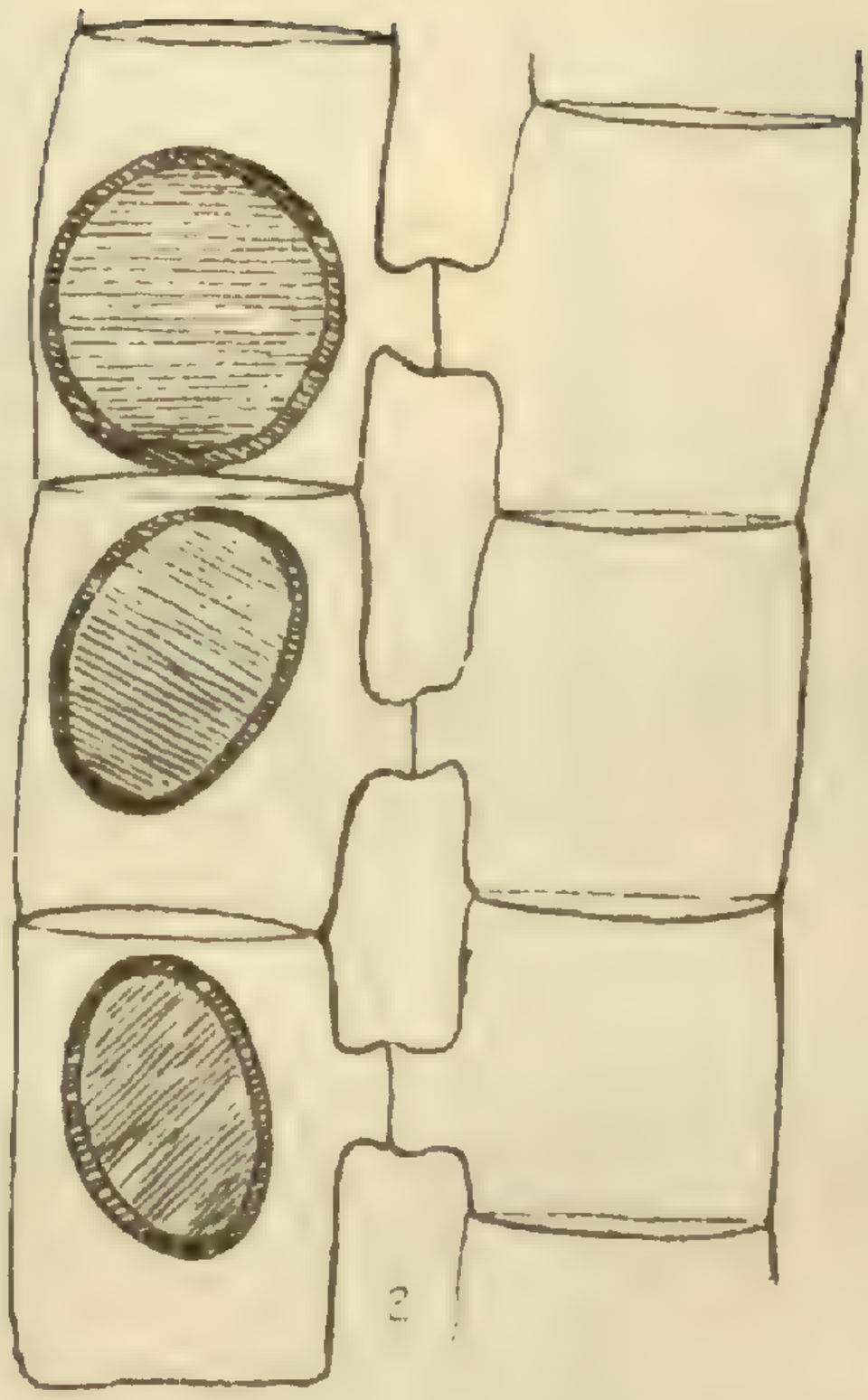

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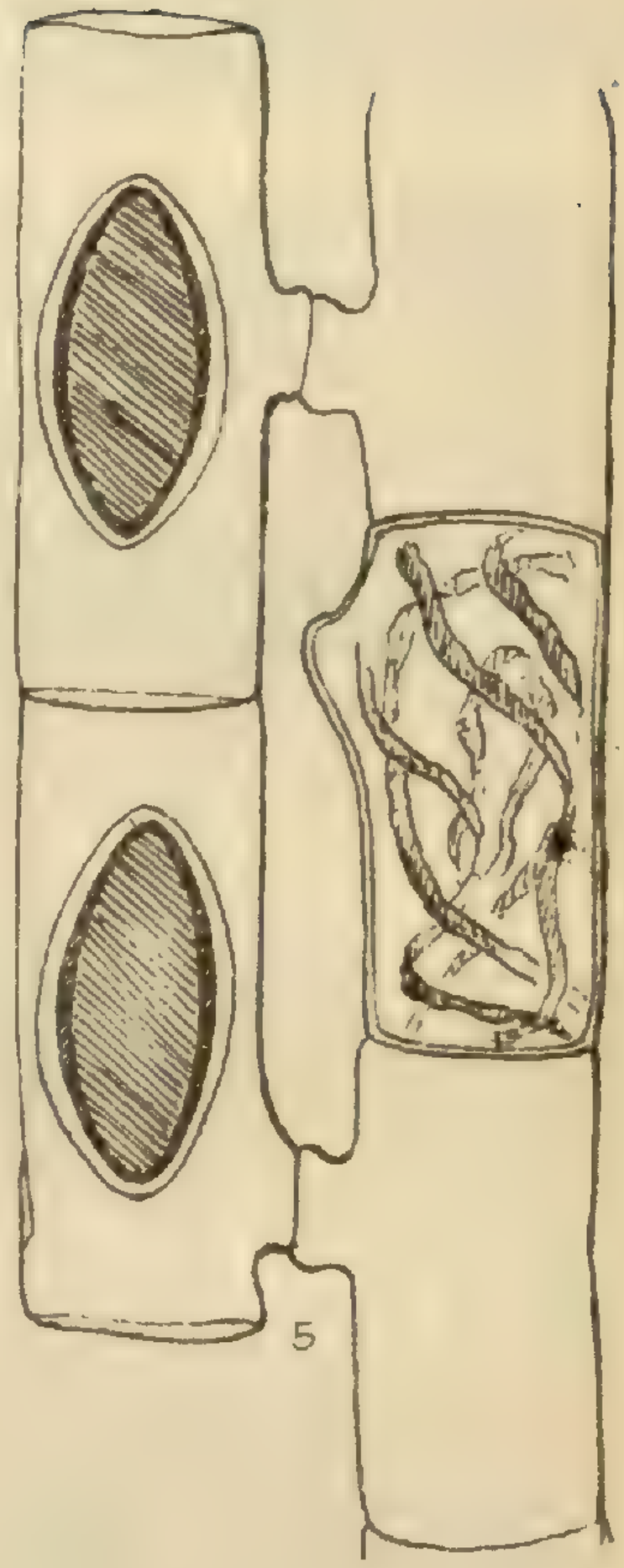

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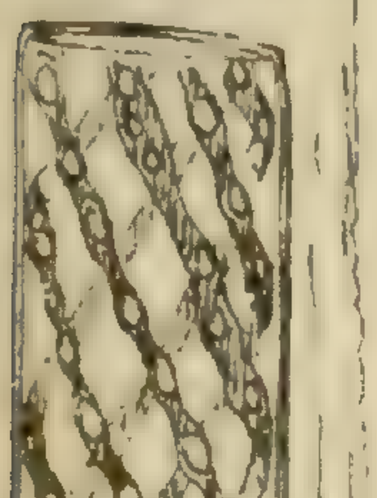

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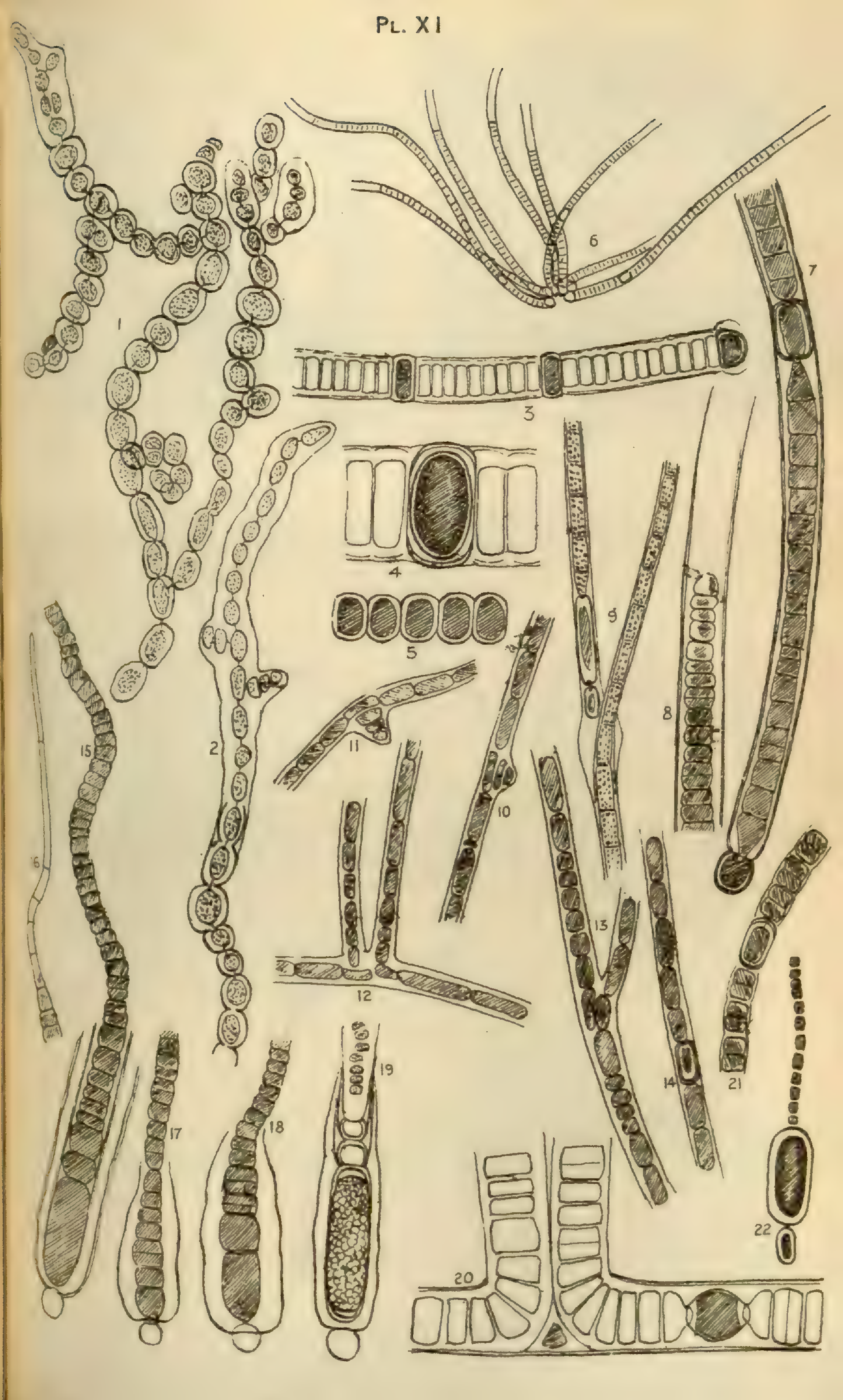
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Pl. XII

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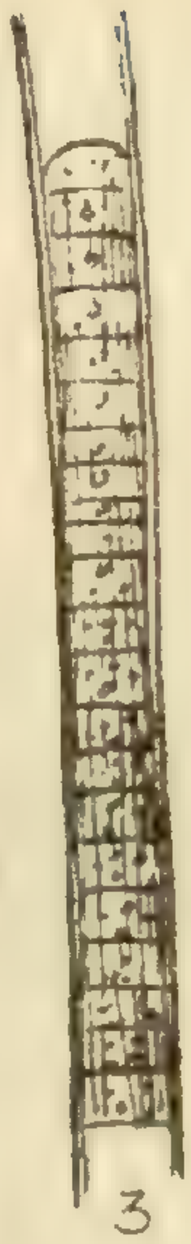

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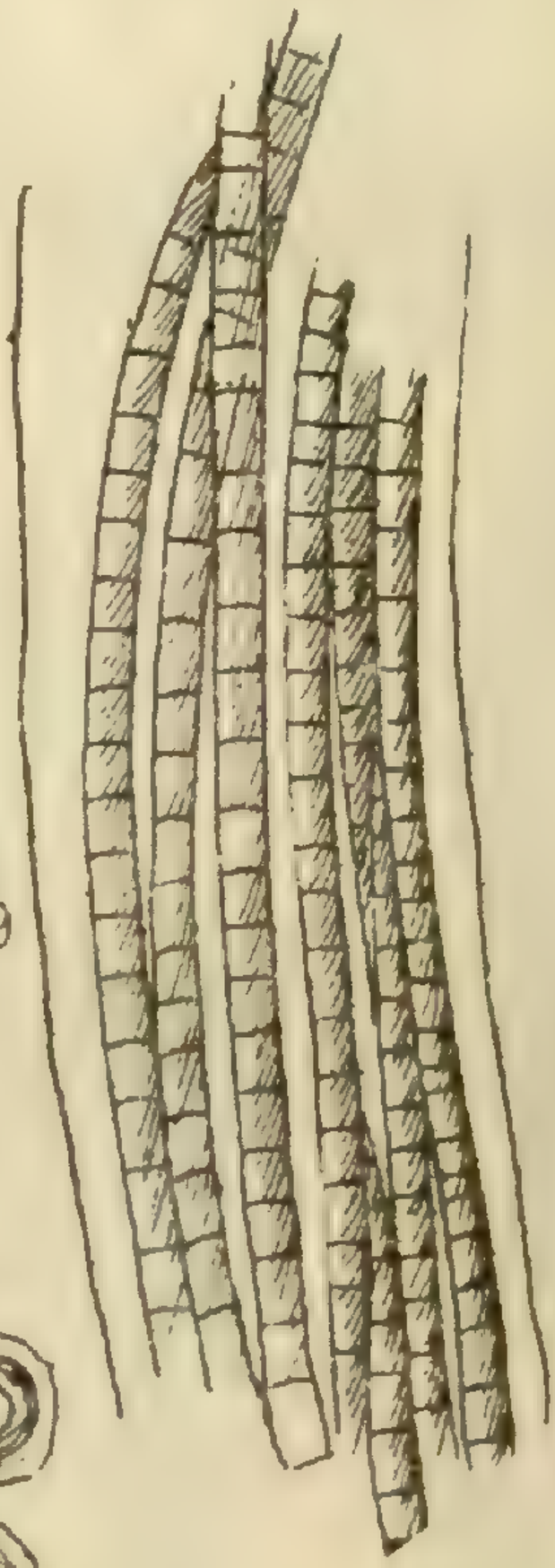

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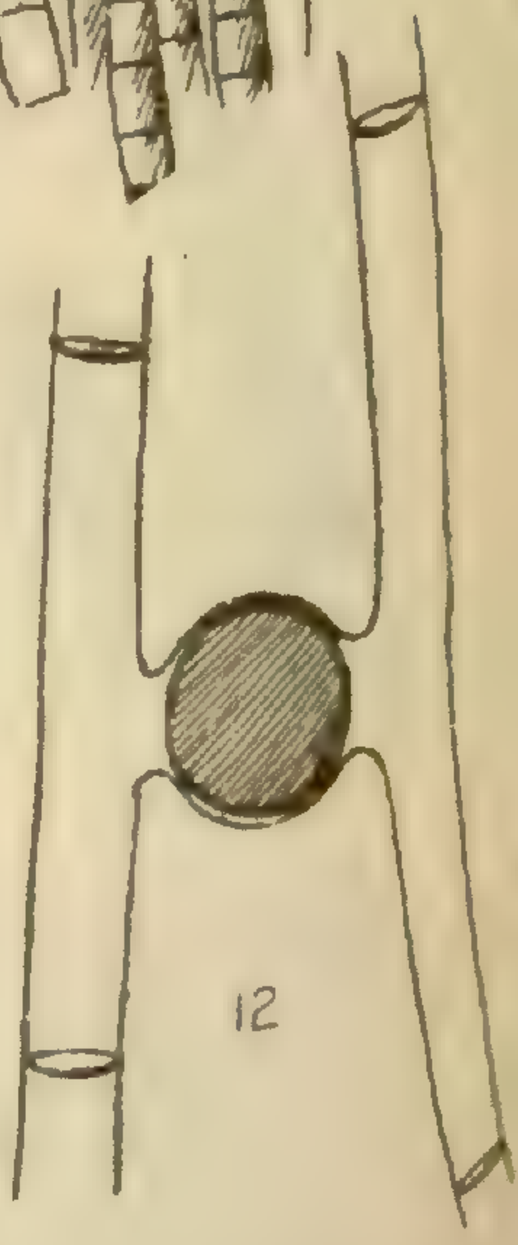

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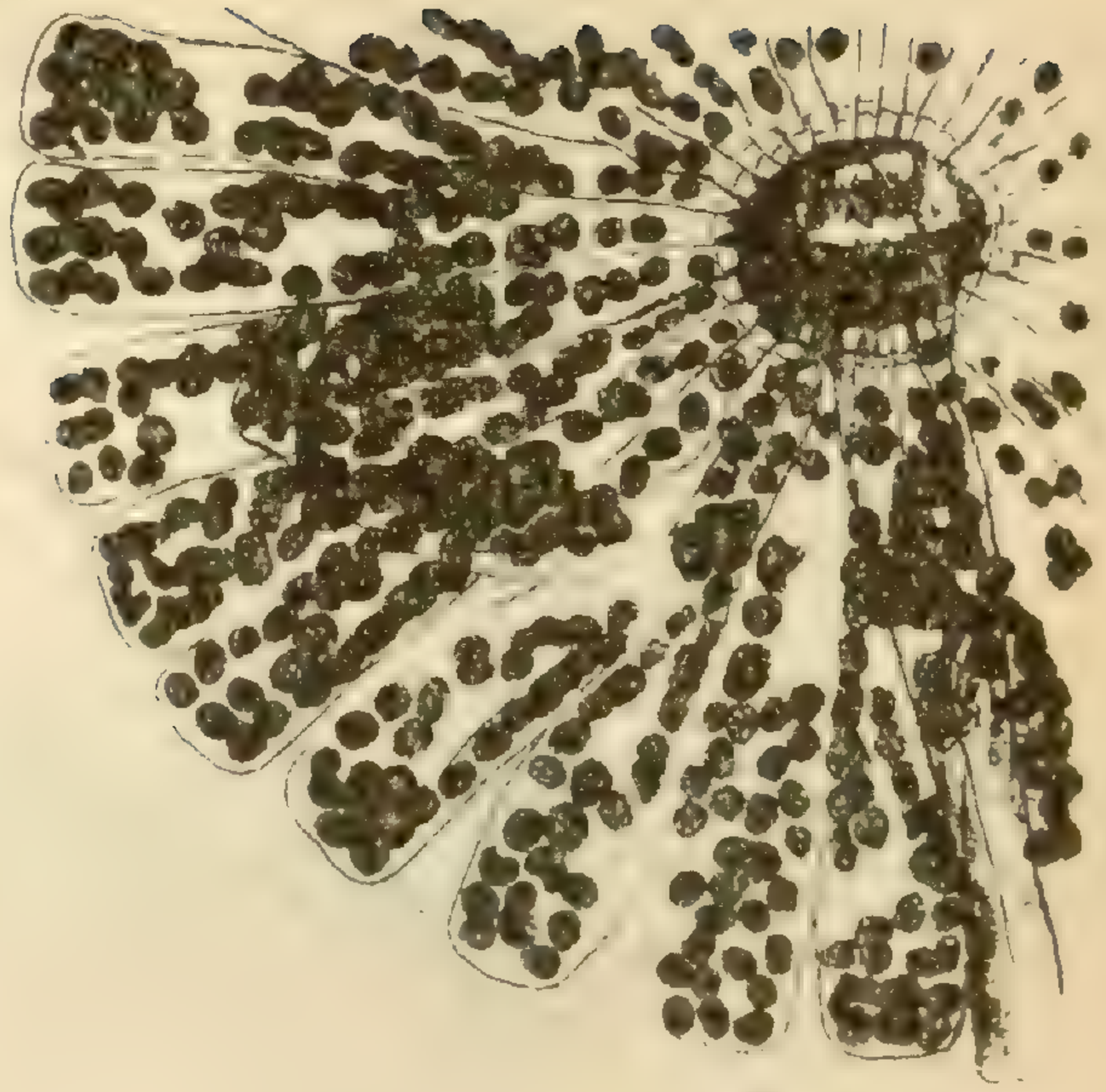

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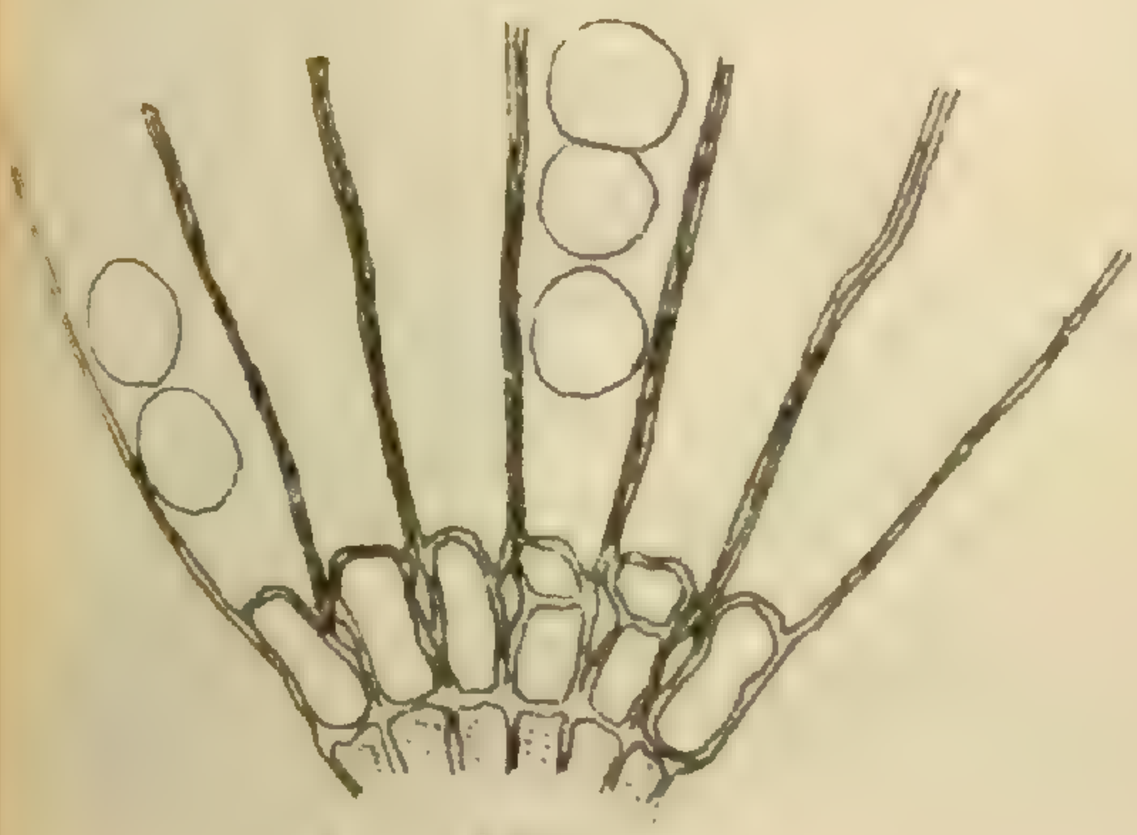

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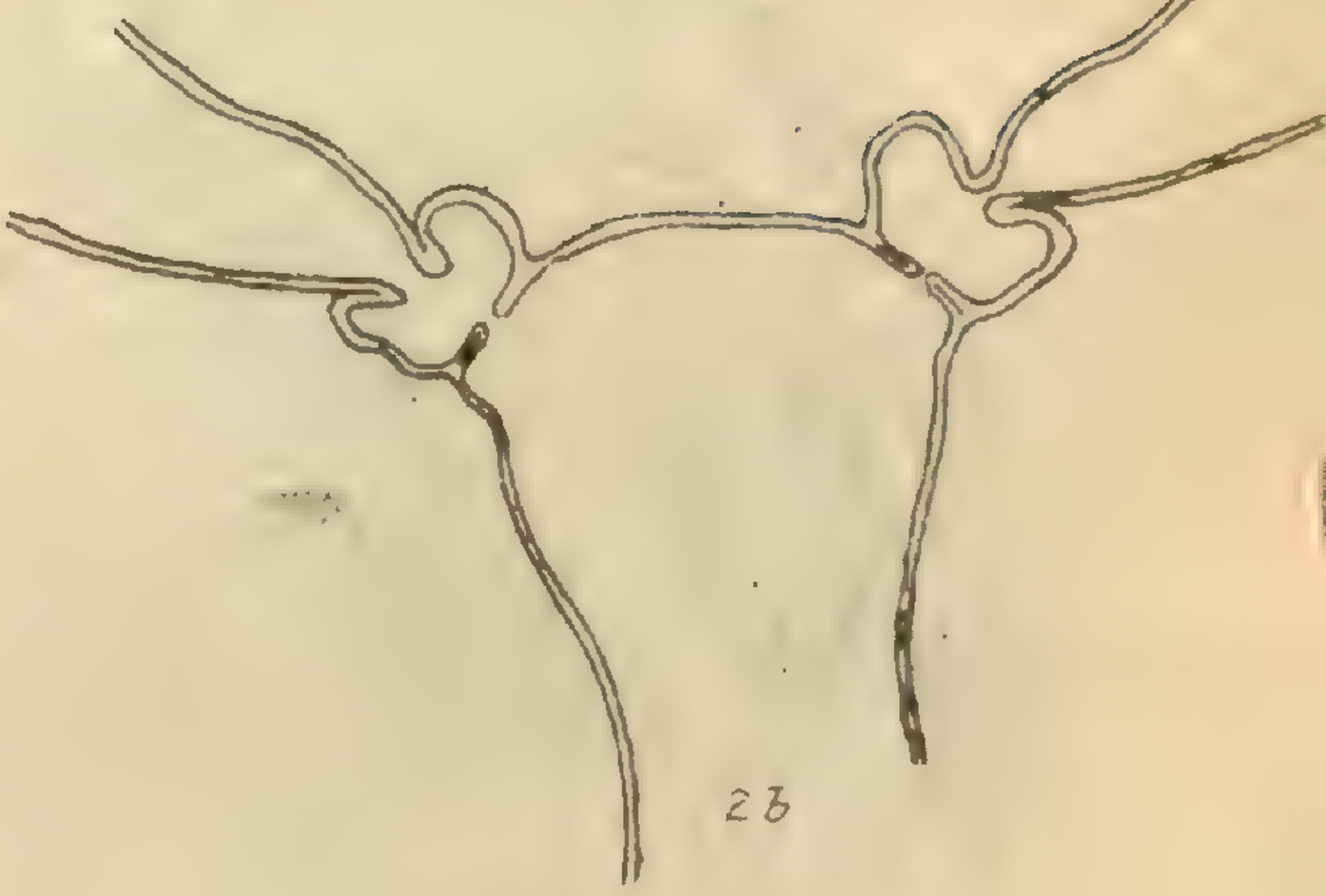

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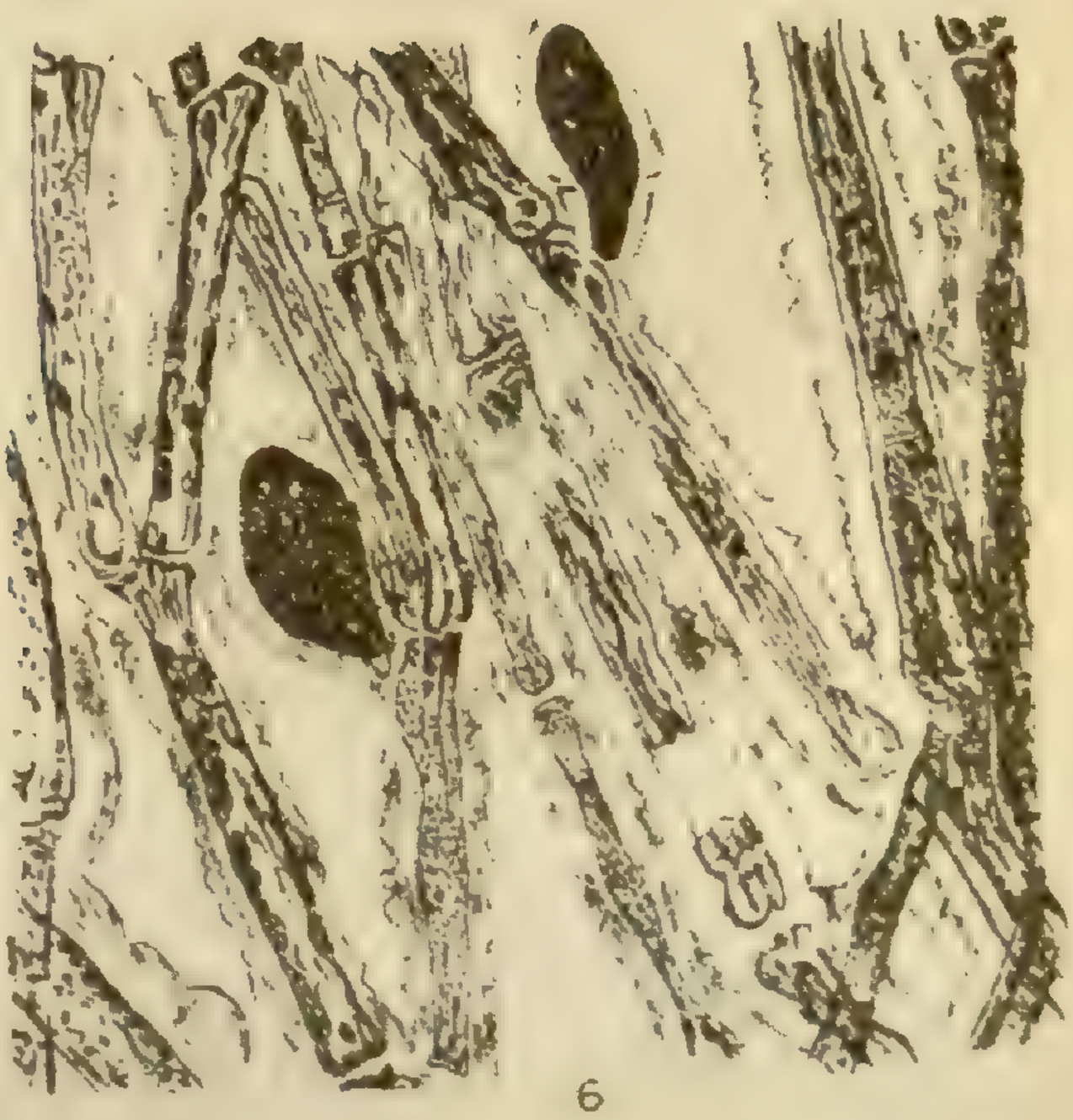

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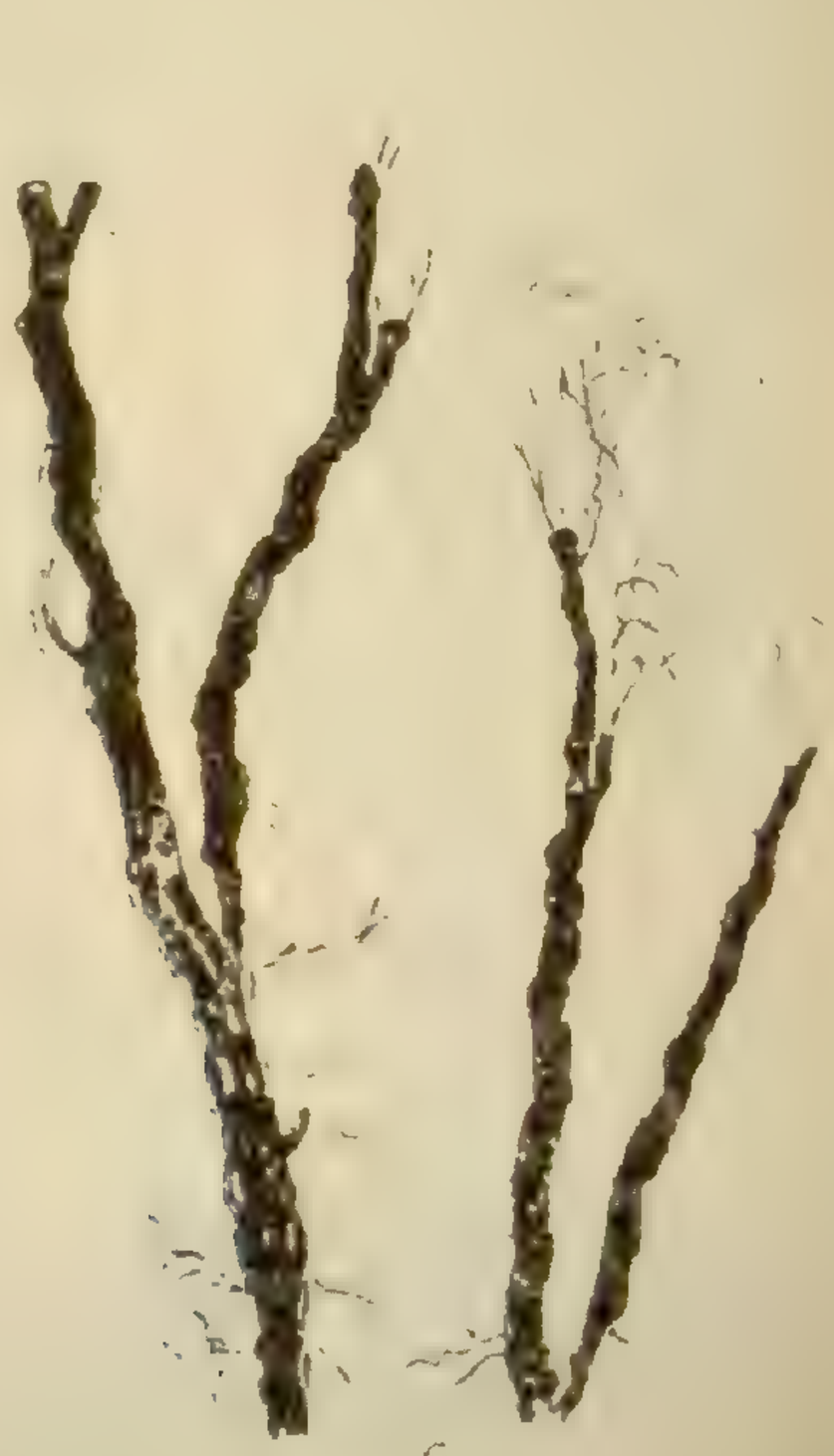

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FIG 1

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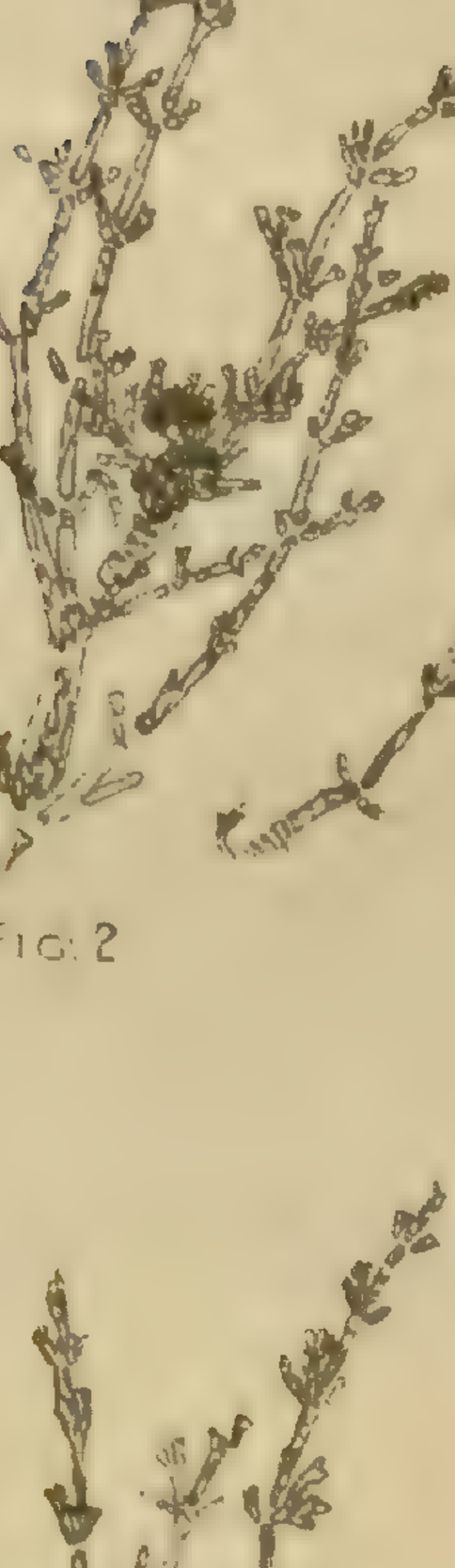

FIG.3

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BOTANY BULLETIN No. XII.

OCTOBER, 1895.

PESTIFEROUS FUNGI,

BY

M. C. COOKE, M.A., LL.D., A.L.S.,

AND

PECULIARITIES OF THE QUEENSLAND FLORA,

BY

F. M. BAILEY, F.L.S.,

Colonial Botanist.

[*Two Papers read at the Meeting of the Australasian Association for the Advancement of Science held in Brisbane during January*, 1895.]

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

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1895.

PESTIFEROUS FUNGI.

By Dr. M. C. COOKE, M.A.

Investigation of the vegetable features of any new country naturally commences with the study and determination of the most prominent objects, such as the trees, shrubs, and the most common or conspicuous of herbaceous plants; and it is not until these have been comparatively exhausted that the more humble and inconspicuous cryptogamia receive any systematic attention. These obscure organisms are, nevertheless, capable of revenging themselves for such neglect, sooner or later, by compelling cultivators of useful or ornamental phanerogams to recognise their power of inflicting injury, and compelling such cultivators to inquire into the character, mode of life, and reproduction of those parasites which they had been disposed to pass over in silence and contempt. Of all the lower cryptogamia the fungi are pre-eminent for their destructive tendencies, and until recent times they were the least known and understood. It is now recognised that wherever plants are cultivated on a large scale, for pleasure or profit, such culture will have to be conducted in the face of a strong opposition from parasitic fungi, increasing in number and in power with the progress of cultivation. Consequently the study and investigation of fungi is no longer a dilettante amusement, but becomes a stern necessity.

There are three principal directions in which the study of fungi may be pursued. Firstly the larger fleshy fungi only may occupy the attention, and these with the object of ascertaining their merits or demerits as articles of food, the possibilities of submitting them to cultivation, or of ascertaining the conditions under which they are produced. This is the purely gastronomic interest, and its end is the production of pretty pictures and the elaboration of savoury dishes. Secondly, the investigation may be an absolutely scientific one, upon purely scientific lines, and merely for systematic purposes. Its great objects are the minute distinctions between one species and another, their affinities and their differences, the elaboration of schemes of classification, and the indefinite multiplication of names and sections. This is chiefly a mechanical interest, and its aim the production, upon paper, of the most formidable array of Latin names in some novel sequence or combination. Verily! they have their reward. Thirdly, there is the biological method, in which the external form and development is but one aspect, whilst names and affinities are but helpers, and not the objects of investigation. In this process the whole of the life-history of the parasite has to be ascertained as far as possible, all its means of reproduction, and whatever promotes or hinders its career or affects its existence. This latter is evidently the only successful mode to be adopted if the parasite is to be brought under control, and the host-plant saved from its depredations. For the pursuit of this method it will be evident that local investigation is indispensable, and that all the surroundings must be taken into account. The mere determination

of a scientific name may be made from a mature fertile specimen, without regard to its development; so that there is no hindrance to the production of a long and elaborate list of names, but such a course leaves the great mystery unsolved—How is the disease to be met, prevented, or eradicated? This can only be solved effectually by a knowledge of the life-history of the offending parasite, and this can only be fully obtained at the place of infection. Thus much it is necessary to premise in order to show that, in countries where the crops have become subject to the attacks of fungus pests, local investigation is indispensable, except in such cases as are universal as to parasite and host, as well as in manner of attack, and then analogies will prove suggestive.

We are well aware that enormous losses in fruit and grain crops may be caused by parasitic fungi if they are permitted to establish themselves, either on account of indifference or ignorance. We are also aware that these losses may be largely diminished by active measures, if taken in time and pursued perseveringly. Wherever orchards or vineyards have suffered, whether in Italy, France, or the United States, successful experiments have followed, which have resulted, if not in the conquest, certainly in mitigation of the disease. It has also been demonstrated that the particular mode of treatment which has succeeded in one locality has not been equally successful in another, which indicates that local surroundings and climatic conditions must be taken into account; and that, although one treatment may not succeed, it is possible that another may produce excellent results.

The inference is that not only should the life-history of these parasites be clearly ascertained, but also those minor modifications which may result from any peculiar mode of culture, from difference of soil or climatic conditions; and also that a knowledge should be acquired of the various remedies which have been tried from time to time in other countries, with the view of testing their efficacy and recording the results. However much the energy of private individuals may accomplish, the knowledge of results is, to a great extent, confined to themselves, and the general interests of the community are not improved by the expenditure of much capital and labour. In countries where well-organised departments of agriculture, experimental stations, or other official centres are established, all experiments with their results are fully recorded, and the records are freely distributed for the benefit of the public. As it is a national loss that so many thousands of pounds annually should fall a prey to fungus pests, it would be a national advantage to establish organisations for the purpose of encouraging experiment, of collecting and distributing information, and generally aiding in the mitigation or extirpation of insect or fungoid pests which affect national industry.

It cannot be urged too often the pressing need of distributing and disseminating information as to the life-history of the various plant parasites, and, as far as known, of remedies which have been more or less successful. One of the most rudimentary lessons to be inculcated is the demonstration that parasitic fungi may be arranged under two types, each with a different mode of development, and each requiring a different mode of treatment. It is, at the least, essential to know to which of these types any given pest belongs before effectual

steps can be taken against it. We have called these two groups the *epiphytal* and the *endophytal*. The former includes those fungi which establish themselves on the surface of the leaves, stems, or other green parts of living plants, and ultimately cause destruction by a kind of suffocation, and not by affecting, distorting, or absorbing the internal tissues. It is natural to suppose that it is this type of fungus pest which is most amenable to the application of fungicides, the object being to destroy the parasite without injury to the host-plant. We may give as examples the hop mildew and the *oidium* of the vine, either of which are to be kept in check by the application of sulphur. In these cases a white mould is developed in irregular blotches or broad effused patches over either or both surfaces of the leaves; the inferior stratum consists of delicate interwoven threads, forming a mycelium, which attaches itself by means of *haustoria*, or suckers. From this mycelium arise the short fertile threads, which are mostly clavate. The upper portion is soon separated from the lower by a septum, at which it is constricted, and this upper cell, of an elliptical shape, becomes a conidium. Whilst this process is going on another septum is developed at an equal distance below the first, and another conidium is differentiated. This process goes on until a chain of conidia is produced from the original branch, the apical conidium being the oldest, and hence the first to separate itself from its companions, and so the rest fall away in succession until they form a thin stratum of conidia on the surface of the mycelium in readiness to be transferred by wind or rain to other and healthy leaves. Upon reaching its new location the conidium germinates by the production of a tube near its extremity, and this germ-tube is the initial stage of a new mycelium. This is the asexual reproduction, by conidia, of the *oidium* condition of the Erysiphei, of which the ordinary European vine mildew and the Australian *Erysiphe viticola* are examples. Later in the season the threads of the mycelium produce a more complex form of fruit. A globose receptacle, of a yellowish colour at first, is to be seen here and there upon the white mycelium. It seldom exceeds a small pin's head in size, and ultimately becomes brown or black. The outer membrane, or perithecium, remains attached, and is soon surrounded with more or less distinct radiating flexuous threads or appendages, which vary according to the genera. Internally the perithecium encloses one, two, or more hyaline pear-shaped sacs, or asci, which contain the sporidia. When mature the perithecia split irregularly, and the asci, with their sporidia, are ejected. Each sporidium is elliptical, hyaline, and capable of germination, the germ threads becoming a new mycelium. This is the ascigerous, and probably *sexual* reproduction.

The whole career of these epiphytal parasites is therefore external and superficial, and, if they can be destroyed by powdering or spraying, the leaves may recover their vigour; but if not, by the destruction of the conidia or sporidia, or by their germination being prevented, the disease is held in check, and its extension to other leaves or other plants rendered impossible. The cultivator who possesses sufficient elementary knowledge of the fungi to determine whether the pests he has to deal with are of this nature is already in possession of the power to treat them effectually. Even the very crude method of picking off the diseased leaves and burning them will limit the area of infection.

More important and more destructive are the *endophytal* parasites, which originate within the tissues of the host plants, and only manifest themselves externally, when it is too late to save the plants. The "rot moulds" are of this kind, such as the potato mildew, American vine disease, tobacco mildew, and many other devastating pests. They are called "rot moulds" because of the rotting of the leaves and stems subsequent to their attacks. Their scientific designation is *Peronosporaceæ*, and they have the habit and appearance of white moulds, but are parasitic on living plants. Here again it is of the utmost importance to know something of their life history and methods of reproduction before they can be combated with success. The mature mould, when it appears on the surface of a diseased plant, produces a profusion of spores or conidia. Each conidium is an elliptical colourless body, having a thin outer coating of membrane with fluid contents. These contents soon become granular, and at length collect at three or four centres, which condense and soon become distinctly separated from each other by the growth of a special envelope. Ultimately the membrane of the mother cell is ruptured, and the three or four smaller bodies, which have been differentiated in its interior, escape, each one furnished at one extremity with a pair of delicate movable hairs, by means of which these little bodies, now termed *zoospores*, can swim actively in any thin film of moisture upon which they may fall. Possibly this film may be upon the leaf of a foster plant. In a short time all motion ceases, and the zoospores come to rest, the pair of delicate cilia are absorbed, and a germinating thread is produced, the point of which seeks out and enters at one of the stomata of the sustaining plant. Having once obtained an entrance, the thread grows vigorously, and a little mass of threads, called a *mycelium*, is soon developed within the tissues, capable of spreading itself through the plant which it has infected. In the next stage we discover that this mycelium has developed erect branched threads, which pass out through the stomata again into the external air, sometimes singly, sometimes in tufts. These are the fertile threads of the mould, which soon produce a single conidium at the tip of each of the branchlets, just like the original conidium whence the zoospores were developed. When fully matured each fertile thread produces a score or more of these conidia, which fall away when ripe, and then undergo transformation into zoospores, ready and active, prepared to pass through the same stages again, and indefinitely multiply the pest. This history represents the ordinary conidial fructification of the mould, by means of which it is passed from leaf to leaf, and from plant to plant, until the whole area is affected. How many of the minute conidia may be transported to a considerable distance by a breath of wind it is impossible to say, but it is known that they may be carried to any spot where there is sufficient moisture for the conidia to be differentiated into zoospores, and afterwards come to rest and germinate. This process takes place in summer and autumn, but there is yet another means by which the pest is disseminated in spring.

The mycelium which flourishes within the substance of the plant infested is capable of producing larger globose bodies, chiefly within the stems, concealed from external view. These globose bodies secrete a thick envelope, mostly of a brownish colour, and after development they remain in a state of rest within the stems during the winter. So

that old stems of plants, which are infested with the mould during the autumn, conceal within themselves during the winter a large number of these "resting spores." As the old stems rot and decay the resting spores are set free in the spring, and then a period of activity commences. The contents of these globose bodies become differentiated into a large number of zoospores, which ultimately escape, by a rupture of the thick envelope, armed with vibratile cilia, and in all respects like the zoospores which are developed from the conidia. These active zoospores swarm over the damp soil, and are carried by the spring rains into proximity with the young seedling leaves of the new crop of host plants; then the cilia are absorbed, germination commences, the delicate threads of mycelium enter the nearest stomata, and infection results. In this way, in addition to the spread of the infection from conidia in summer and autumn, provision is made for an attack upon seedlings in the spring. It will be inferred that, in order to check the spread of these diseases, the conidia must be destroyed in the autumn, to prevent their extension to healthy plants; and the destruction of all rotting *débris* must be carried out during the winter, so as to extirpate all the concealed resting spores, and thus prevent the infection of seedlings in the spring.

From these details it will be evident that plants once attacked by endophytal parasites are in themselves hopeless. No external application can destroy organisms which it cannot reach, or, if they could be destroyed, no manipulation can replace the disorganised tissues. Hence, then, all efforts should be directed towards the destruction of the conidia and resting spores, in order to stamp out the disease at its source, and prevent the future infection of healthy plants. The application of spraying to plants apparently without disease would be done as a preventative, in order to destroy at once any germs which might be brought into contact with the foliage; and the destruction of all infected material would limit the local sources of infection. With an intelligent appreciation of the objects which have to be attained, the cultivator may accomplish a great deal in the way of prevention, even though he may be helpless to effect a cure. It will be seen how much of this depends upon an accurate diagnosis of the disease.

There are many other forms of endophytal parasites, and the life history of some of these is still obscure. In the majority of them only a conidial fructification is yet known, and the internal tissues do not appear to be so absorbed and destroyed as in the case of the "rot moulds"; but in such black moulds as the "apple and pear scab" the mycelium appears to be perennial, and produces a fresh crop of conidia each successive year. There is some evidence that this disease is deep-seated and hereditary, and, if so, it is doubtful whether any amount of external application will result in a perfect cure. The genus *Glæosporium* includes many species which are very destructive, but often they seem to be localised, and the mycelium may not pass internally to other parts. This can only be ascertained by closer investigation. The little pustules on the leaves and the fruits are seated beneath the cuticle, where a cushion or stroma of compacted mycelium produces conidia, but without any enclosing membrane or perithecium. When the conidia are matured, the cuticle is ruptured, and the spores escape to the surface, in many cases adhering in a somewhat

gelatinous mass, which oozes out in the form of tendrils. In such cases it is evident that the application of some fungicide capable of destroying the vitality of the conidia will be of service in preventing the spread of the disease.

A large and important group of endophytes is that known as the Uredines, of which the common and disastrous "wheat rust" or "wheat mildew" is an example. We have given a brief outline of their life history elsewhere,* and it is only necessary to allude here to the persistency of the teleutospores in some of the species. These teleutospores are produced within pustules on the green parts of plants, and are at first covered by the cuticle. On arriving at maturity the cuticle is ruptured so that the teleutospores may escape. In certain species they escape almost immediately as a dark-brown powder, and germinate at once. In othes species they form a compact mass, which remains adherent to the matrix, and in that condition they rest for a long period, probably through the winter, in a state of hybernation, and germinate in the spring. It will be evident at once that the destruction of these clusters of teleutospores will minimise the spring infections, and hence that they should be well looked after and destroyed either by effective fungicides or by burning up all the dead leaves and stems of the foster plants known to have been affected. In this case, again, we must suggest the importance of acquiring some practical knowledge of the history and mystery of such plant parasites, if they are to be encountered and vanquished in their career of destruction.

In this connection we cannot omit alluding to the evidence, which is gradually accumulating, of the connection between those minute organisms the Microbes, or *Schizomycetes*, and plant diseases. There are certain diseases which attack cultivated plants and produce disastrous results, which have long been a mystery, since, although the host plants appeared to be suffering from the attacks of some insidious fungus disease, none of the usual external appearances could be detected. In several cases of this kind it has been affirmed, although not yet completely confirmed, that the disease is caused by the presence of a minute *Bacterium* or *Bacillus* in immense numbers. There is no reason, analogically, why this should not be the case, and all the evidence seems to strengthen the probability; but the suggestion is so recent and the investigation so difficult that it would be imprudent to hazard any very decided opinion. Researches into a vine disease in California, a melon disease in some parts of the United States, and the very prevalent "peach yellows" almost establish the fact that microbes are present in large numbers, and are, hypothetically, the cause of the disease. In reference to the disease of cucumbers and melons, it has been claimed that the disease is accompanied profusely by bacteria; that the juice of diseased plants swarming with these organisms when transferred to healthy plants will inoculate them with the disease, which will make its appearance in three or four days; that seed watered with the juice of diseased fruits did not germinate, or only 25 per cent. germinated at all, and these soon decayed; that the diseased juice when introduced into healthy stems and fruits of tomato rapidly produced decay; that young tomato plants in proximity with diseased cucumbers were all destroyed. Hence it is

* Handbook of Australian Fungi—Introduction, p. xxii.

concluded that the disease in question is caused by bacteria, and may be transmitted to other plants by inoculation. If all this should be confirmed, then we shall have to deal with another class of plant diseases of fungoid origin, which will require a different mode of treatment, and doubtless offer a stubborn resistance.

From the foregoing observations it will be manifest that there are such broad distinctions between different groups of pestiferous fungi that they should not all be subjected to the same mode of treatment, and that the remedies which might be successful in cases of one kind would be powerless in another. Hence, then, modes of treatment must have a relation to the known character of the parasite. It follows from this that a certain amount of knowledge of the life history and affinities of the parasite must precede any definite effort to counteract or destroy it, as in animal diseases an accurate diagnosis must precede treatment. Such being the case, it is important to consider what means can be employed to diffuse the necessary information amongst cultivators, so as to enable them to determine the general character of the disease. This does not imply the specific identification of the fungus, which would be the work of an expert, but the general characteristics only, and especially whether the disease is caused by an endophyte or an epiphyte. After this, presuming it to be an endophyte, whether it is related to the rot-moulds, the forms of Anthracnose as represented by species of *Glæosporium*, or to the "rusts" or Uredines, the cultivator in possession of the power to determine thus much for himself might easily learn what remedies have been most successful in similar cases, and apply them systematically with some hopes of success.

In countries where there is any extensive culture of fruits or vineyards as a commercial enterprise the Departments of Agriculture there are sometimes found to apply themselves to a limited extent to the dissemination of information or the acquisition of reports on the chief diseases to which the culture is liable. These should naturally be the centres of activity for such purposes, but experience has shown that they are apt to ignore vegetable parasites until such pests have passed into an extreme stage, when they are exceedingly difficult to combat. Self-help is more important and effective than official aid, and the stimulant to self-help may be furnished most effectually by the diffusion of useful knowledge in such a form and in such a manner that the culturist may be able to recognise at once the attacks of disease, ascertain its character, and oppose checks to its progress before it becomes an established pest. It seems to us that such departments as we have alluded to, or some similar central authority, would be well employed in perseveringly disseminating such elementary information as we have suggested in these observations, or any suggestions which might enable the culturist to recognise a fungus pest, to determine its character, and to apply remedies intelligently and systematically. It should not be difficult to furnish a "guide" for the use of fruit-growers everywhere, which should set forth the various known diseases in this category, their life history as far as has been determined, the circumstances which are favourable to their development, and the remedies which have been tried. Such a work would be a sort of "domestic medicine" for vegetable diseases, and would be a manual for self-help in all emergencies. Although the Germans

have two or three works of repute which would serve this purpose, there is none, unfortunately, in the English language which covers the whole ground, or touches other than field crops, or extends beyond an agricultural interest.

This communication cannot pretend to do more than to touch the fringe of a most important subject, and to urge it upon the attention of all who are interested in the success of the vineyards and orchards of Australia. Specific and detailed information would have been out of place, and could not have been circumscribed within the necessary limits, besides which it is not so important, in the first instance, as those general characteristics which determine the nature of the parasite, and the direction which remedial efforts must assume.

We are driven to a reiteration of the old adage that "knowledge is power," and to make its application to pestiferous fungi a final argument, since it will be evident, from the very nature of the pests, that the individual who has possession of the elementary knowledge necessary to discriminate the differences between an endophyte and an epiphyte will have a great advantage over one who does not possess such knowledge, and will be ready to take action at once, without waiting for extraneous help, meanwhile permitting the parasite to establish itself, to the increase of its power. It is matter of history that prompt action, when made in the proper direction, may save a crop; but such action presupposes knowledge, and in proportion to the extent of that knowledge will success follow its application. "I speak as unto wise men, judge ye what I say."

PECULIARITIES OF THE QUEENSLAND FLORA.

By F. M. BAILEY, F.L.S., Colonial Botanist.

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I.—INTRODUCTORY REMARKS.

My intention in preparing the present paper has not been to furnish a general review of the Fiora of Queensland. My object has rather been to make a few remarks upon some of what might be termed the remarkable features of the Flora in regard to distribution, habit, stature, properties, &c. An extensive territory like Queensland, with a seaboard of about 2,500 miles, would lead one to expect a rich and varied flora, and such indeed is the case. Few countries have plants of more intrinsic value, whether viewed in an æsthetic or economic sense. The fodders are almost innumerable, and include some hundreds of kinds of most nutritious grasses. The woods number probably 1,000 sorts, amongst which are those suitable for all conceivable purposes for which this material is used. The barks of many are rich in tannin, while the foliage is rich in fragrant oils, which, with the exudent gum and resin, have become articles of export. It may be here aptly mentioned that within the last few months my friend Dr. Jos. Lauterer has found that the young twigs and foliage of *Cinnamomum Oliverii* yield a good percentage of a camphor identical with that obtained from the Chinese tree, *Cinnamomum camphora*. Few indeed are the plants of our indigenous Flora which may be termed really hurtful to stock or dangerous to man. A large number, however, are considered by the bushman and country settlers to possess medicinal virtues, and some few have been extolled by the medical faculty. In food plants and edible fruits also Queensland is not far behind any other country; persons, however, are apt to compare these wild fruits with those in cultivation, and overlook the immense amount of time, care, and skill which has been bestowed upon our cultivated plants to bring them to their present state of perfection. Even in the wild state many of the indigenous fruits are of great service to the settlers, who convert them into excellent jam for home consumption, and probably those now in use are inferior to many met with in the bush far from settlement, and thus only known to travellers through unfrequented parts, such as the scrubs bordering the Northern rivers and mountain ranges. The portion of our continent now known as

Queensland has been a favourite hunting-ground for the botanist since Banks and Solander collected along the banks of the Endeavour; yet, although much has been done to collect specimens of our plants, so rich is the Flora in species that one can but consider that a mere skimming of the number has been collected. Persons who do not know the country would probably think that most of the important plants are known; such, however, is not the case, for frequently specimens of new timbers, fruits, and fodder are received, especially from the Northern districts. These reach the botanist for determination, the people being generally fully aware of the folly of trusting to local names alone.

With these few remarks upon our Flora generally, I will now pass on to point out, under separate headings, something of the peculiarities of the plants. Besides the many new species which are becoming known as the colony is further and more carefully explored, the botanist has from time to time to correct or furnish additional matter to the descriptions which have been already published. In like manner it must be understood that some of our later names and descriptions, like those of an earlier date, must be taken as provisional. It may be asked, Why name until a full and complete description can be published? The answer is,—That a name, and as full a description as possible, becomes at once necessary, to distinguish the plant from others, and afford the means of intelligibly communicating one with another about it. I will therefore, in the first paragraph, refer to a few instances where the character, habit, or stature of plants has been found to differ widely in what appears to be the same species though gathered in far distant localities.

II.—CHANGE OF CHARACTER, HABIT, OR STATURE PROBABLY DUE TO CLIMATIC INFLUENCES.

The remarkable difference in character, habit, or stature which one meets with in the same species, when found in far distant habitats, is worthy of remark. Indeed, so distinct do these plants appear that one need not be surprised at botanists having at times given to them distinct specific names, and afterwards allowing such names to lapse. I, however, think it advisable, if only for convenience' sake, that all forms or varieties, when at all pronounced, should bear distinctive names. An extraordinary instance of this change of character takes place in *Strychnos psilosperma*, F. v. M. Until recent years this species was considered to be confined to the tropics, and there to form a large rambling shrub or small crooked-stemmed tree. But, when collecting woods for the Colonial and Indian Exhibition, I found this species not uncommon in the Brisbane scrubs, and always forming straight erect trees, 60 or more feet in height, and a diameter of trunk about 12 inches. Similar trees I have since met with in the scrubs at Eumundi. It must, therefore, be conceded that this southern plant is the normal form, and that met with in the tropics only a depauperated growth or form, for I find no botanic distinction. The only reason which can be given for this tree having escaped detection so long is probably due to its resemblance to *Carissa ovata*, the leaf being small in the southern tree and the fruit seldom met with on small specimens. The grasses, *Setaria glauca*, Beauv., and *S. macrostachya*, H. B. and K., are other examples where the tropical representatives are of a much smaller growth, and which might well be known as named varieties. We

usually expect to find the tropical form to be more robust or the foliage and fruit to be of larger size, and such is indeed the case with some of our plants. Take, for instance, the inflorescence of *Cenchrus australis*, R. Br. No one, who for the first time was shown specimens of the southern and northern forms of this grass would take them to belong to the same species. In the case of the Red Ash—*Alphitonia excelsa*, Reissek—the foliage is often very dissimilar; but where such is not the case the tropical fruit is fully twice the size of the southern. The same also takes place in the fruit of *Eupomatia laurina*, R. Br. In the She Pine—*Podocarpus elata*, R. Br.—the foliage of the northern tree is several times longer than the southern. In the above examples the species are met with in different localities, reaching from the southern to the northern limits. But there are some curious instances where the habitats of a species, so far as at present known, are some hundreds, perhaps 1,000 miles apart; and these in some cases have received distinctive specific names, as, for example, the Davidsonian plum—*Davidsonia pruriens*, F. v. M.—the well-known useful fruit of tropical Queensland, and *D. Jerseyana*, F. v. M., found on the southern border of Queensland and in the adjoining scrub lands of New South Wales. It seems to me that size of foliage and fruit is the principal distinction between these two plants; and I may remark that on southern-grown plants of the northern tree the fruit never attains more than half the size it does upon the trees in Northern Queensland. *Acronychia acidula*, F. v. M., is a small tree met with on the borders of the tropical scrubs, and not again, so far as I am aware, until we find it near the Logan River. This has never thus far received more than the one specific name; yet the difference between the northern and southern tree is quite as much marked as in the Davidsonias. The foliage and fruit of the tropical tree are much larger; the fruit also is of very irregular form. The southern fruit has a much more agreeable acid flavour, and is of an even, globular shape; the leaves also are of a brighter green. This form was first discovered by the late Rev. B. Scortechini, and might safely bear his name as a variety of *A. acidula*.

III.—DISTANT HABITATS WITHIN THE COLONY.

I will now refer to one or two of our plants which are at present only known from far distant localities, but in which no change of character has been observed. Being probably a very rare tree, I notice *Erythroxylon ellipticum*, R. Br., first. That excellent botanist, Dr. Robert Brown, was the discoverer of the plant, which he found, at the beginning of the present century, on the mainland opposite Groote Eylandt, in the Gulf of Carpentaria. No other specimens seem to have been obtained, either there or elsewhere, until I received some from the Walsh Range, a distance probably of 500 or 600 miles from Dr. Brown's habitat. This botanist describes the plant as a shrub of about 5 feet high, but probably he could not spare time to look about, or he might have met with some plants of a larger growth; for my correspondent at the Walsh Range describes the tree as attaining a height of 35 feet, with a stem diameter of 12 inches. I have received logs from the locality exceeding this dimension.

A Pomaderris, which I take for an apetalous form of *P. phillyreoides*, Sieb., is met with around Stanthorpe, on the Glasshouse Mountains, about Herberton, and on Walsh's Pyramid, a mountain at the Mulgrave.

The wiry grass, *Rottboellia rariflora*, Bail., has yet only been met with at the Batavia River and about the Musgrave Station, Cape York Peninsula; this latter locality is also the only Queensland habitat of *Elæocarpus arnhemicus*, F. v. M., although the tree has been met with in several parts of the Northern Territory, South Australia, as well as in New Guinea. From the above station on Cape York Peninsula I have also received specimens of *Owenia vernicosa*, F. v. M., the only other places where this tree has been met with being Cambridge Gulf, Western Australia, and the Northern Territory of South Australia.

Graptophyllum spinigerum, F. v. M., so far has only been met with in two localities—the Endeavour River and the Eumundi scrubs, which are about 1,000 miles apart.

One of the most remarkable instances of the wide distance between the habitats of some of the Queensland plants is the meeting with trees of the "Stringy-bark Pine," *Callitris Parlatorei*, F. v. M., on the Bellenden-Ker Range in 1889, for prior to this the tree was thought confined to New South Wales and the ranges of the Southern Queensland border.

That beautiful variety of the leafless terrestrial Orchid Dipodium, *D. punctatum*, var. *Hamiltonianum*, is so far only known from three very distantly separated localities—viz., the islands of Moreton Bay, Stanthorpe, and in one part of New South Wales.

IV.—REPRESENTATIVES OF GENERA USUALLY ONLY FOUND IN COUNTRIES DISTANT FROM AUSTRALIA.

Under this head I shall only refer to plants which have been brought under our notice during recent years. As the most distant, two South American genera may be first noticed—viz., Omphalea and Bursera. The first of these, *O. queenslandiæ*, Bail., is a rampant climber in the scrubs of the Johnstone and Russell rivers. It bears a large globose fruit, containing from two to four round nuts, which abound in oil, and are only eaten by the natives when fresh gathered. The second plant, *B. australasica*, Bail., by some known by the name of "carrot-wood," is a tree of considerable size, met with in the Eumundi scrubs. The next most interesting addition to our known flora is a species of the Mexican genus, Zinnia, *Z. australis*, Bail., found near the Walsh River.

One need not feel surprised at meeting in Queensland with some of the following plants, the only wonder is that they have not been found earlier, for some are plants enjoying a wide range through the world, and others are well known in India, or are species of genera indigenous to India or countries nearer to Australia.

Carpesium cernuum, Linn.—A plant met with in several different countries; has been found in a few localities in Southern Queensland. When I first published this as indigenous to Queensland, certain botanists took exception, for some reason unknown, considering the plant as an introduction; but from the localities in which it has been found, there is not the least doubt that it is truly indigenous; indeed, were we to reject this plant then a large number of others would have to be eliminated from our flora.

Oxalis (Biophytum) *Apodiscias*, Turcz., is another instance of a plant which is to be met with in several distant parts of the globe, being also indigenous in Queensland, but, so far as at present known, confined to one locality—Musgrave, Cape York Peninsula.

Boehmeria macrostachya, R. Wight.—An Indian shrub; has so far only been met with in Queensland in one locality—viz., a creek running from Tambourine Mountain. Here, however, it was found some few years ago in great luxuriance. Another instance of a plant being found in Queensland which had previously only been known from a distant region is the meeting with fine specimens of trees which Dr. Rumphins described and figured in Herbarium Amboinensis as *Cassia fistula*, var. *silvestris*; for an account of which see my Third Botany Bulletin, page 11, where it is given as *C. Brewsteri*, var. *sylvestris*. So far as at present known the only Queensland habitat of *Uncaria ferrea*, DC., is the scrubs bordering the Mulgrave River. This tall climber, however, is common in India. In passing, I may remark that Dr. Thos. L. Bancroft found the leaves of this plant to contain "Gambier" similar to that obtained in India from other species of the genus. This Queensland plant should find favour with our cultivators for producing the above astringent, which is used in tanning and medicine, and, mixed with dammar oil and applied to wood, is said to preserve it from white ants and dry rot; thus there should be a local demand for the produce.

The Order Rosaceæ is but poorly represented in Australia, and its tribe Pruneæ until recently altogether unrepresented. It is a great pleasure, therefore, to the botanist to find amongst the scrub trees at the Barron River one of the genus Pygeum, a new species described in my Botany Bulletin VIII. as *Pygeum Turnerianum*. In this locality has also lately been met with that curious Olacineous climber, *Cardiopteris lobata*, the Queensland plant being the variety *moluccana*, which so closely resembles a yam (*Dioscorea*) as to have been labelled in an European herbarium as *Dioscorea sativa*.

V.—WITH REGARD TO PECULIAR HABIT.

Some of our small trees or tree-like shrubs have such a peculiar mode of growth that it may not be out of place to refer in this paper to an example or so, some of which, however, when better studied may prove well-marked varieties or even distinct species. I would first refer to the Queensland nut, *Macadamia ternifolia*, F. v. M. In the southern parts of the colony this forms a fine, handsome, erect tree, fruiting pretty regularly year after year; whereas at Maroochie, say, about 70 miles north of Brisbane, what appears to be the same species has a very different habit of growth. Here the plant sends up several stems from a hard, broad, irregular, rhizome-like base; and as these stems attain the height of from 15 to 20 feet and bear a crop of fruit, they are said to die away somewhat similar to herbaceous plants, the next stems in age and size taking their place. I have seen this growth myself, and was told by an old resident of the district that it was the usual mode of the nut-tree in that district. The only other instance of this habit of growth of which I have heard is recorded by Miss Lovell, of Sandy Cape, Fraser Island, who says that *Pithecolobium Lovellæ*, Bail., after attaining the height of from 20 to 30 feet,

dies off in a somewhat similar manner, other stems from the same rootstock taking their place. I have noticed at Eumundi that something like this occurs with the closely allied species, *P. Tozerii*, F. v. M., but at the time I attributed this to the effect of a borer insect, which destroyed so many of the stems.

VI.—INDIGENOUS FRUITS RECOMMENDED FOR CULTIVATION.

Under this heading I purpose offering a few remarks upon some of the indigenous fruits. We are fully aware that to a large number of Queensland residents these native fruits are unknown, while to others they are known, used, and appreciated; and we may fairly hope that as time rolls on, and vulgar prejudice dies out, that our fruits will be allotted a place in the fruit garden, and the produce known in commerce. Useful, however, as they undoubtedly are to the settler in their wild state, we must not be content to remove these wild plants into our cultivation plots without a thought as to climate, situation, careful selection, and cultivation. Even in the bush it may be noticed that one tree produces fruit superior to another, although the trees are of exactly the same kind, and it is from such that we should obtain our plants intended for experimental cultivation purposes.

The thirty-one kinds which I bring under notice are selected from fifteen genera, and for convenience are given alphabetically according to the botanic name—viz., *Acronychia acidula*, F. v. M., Logan Apple, Order Rutaceæ. This forms a round-headed tree 20 or more feet in height, and produces an abundant crop of a sharply acid fruit of a whitish colour, nearly round, and 1 inch in diameter, which may be improved by selection and cultivation. I have also tasted excellent jam which was made at Fraser Island from the fruit of another species of this genus, *Acronychia imperforata*, F. v. M. The fruit of this is not quite so large as the last mentioned, is of a reddish colour, and imparts its colour to the preserve.

Of the Euphorbiaceous genus *Antidesma*, five of the Queensland species furnish the settlers with fruits from which excellent jam and jelly is made, viz.:—

A. Bunius, Spreng., the fruit of which is also largely used in Java, especially by the Europeans, for preserving. In tropical Queensland it is also put to a like use.

A. Dallachyanum, Baill., the "Herbert River Cherry."—This forms a good-sized tree, and produces abundant crops of fruit, which ripen about July. On different trees the size and colouring of the fruit vary a good deal, the largest being about 1 inch in diameter; they are nearly round, very juicy, and of a very sharply acid flavour. The jelly made from this fruit is quite equal to that made from the European red currant.

A. erostre, F. v. M., bears a much smaller fruit, which is used for jam and jelly making at the Barron River.

A. Ghæsembilla, Gærtn. The fruit of this species is in use at the Walsh River for jam and jelly making by the settlers.

A. parvifolium, F. v. M., is called "Currant Bush" at the Gilbert River, and is used, like all the others mentioned, for preserving, and is considered a most wholesome and agreeable fruit for the purpose.

Under careful cultivation these fruits would probably greatly improve, and become favourites with the public; but, although they will all grow and produce fruit in the Brisbane district, they are more fitted for the tropical parts of the colony.

Atalantia glauca, J. D. Hook. The Kumquat or Lime of our Downs country. Order Rutaceæ, and closely allied to the orange; often attains the size of a small tree, but while only the size of a small shrub yields a great abundance of fruit, which is gathered and converted into jam by the settlers. By careful selection and cross-fertilisation from this might be obtained varieties worthy of cultivation for the sake of their fruit.

Species of the closely allied Citrus family are—*C. australis*, Planch.—the round-fruited Native Orange or Lime, which in some of our mountain scrubs forms quite a large tree, with fruit 2 or 3 inches in diameter; and *C. australasica*, F. v. M., the Finger Lime, whose fruit is frequently as much as 4 inches in length, with a diameter of ¾ or 1 inch. The variety of this species—*sanguinea*, Bail.—only so far as at present known to be met with on Tambourine Mountain, differs from the normal form in the colour of its fruit, which is blood-red throughout. These long fruits differ from the round in having a thinner rind, and the acid being of a more delicate flavour.

C. inodora, Bail., "The North Queensland Lime," which so far has only been met with in the scrubs about the Russell River, differs in its foliage, which has a greater resemblance to the cultivated species; its fruit is over 2 inches long, and 1¼ inches in diameter; the rind is thin, pulp juicy and of a sharply acid flavour. Even in the wild state it is a desirable fruit, and takes the place of the cultivated lemon.

Davidsonia pruriens, F. v. M., "The Davidsonian Plum," is a small tree of graceful, erect habit, belonging to the order Saxifrageæ, which in tropical Queensland bears an oval fruit the size of a goose-egg, the outside of which is covered with short stiff hairs; these, however, are easily removed by a slight rubbing with a rough cloth, and then is exposed the smooth purple plum-like skin of the fruit; the interior is composed of a few flat, irregularly-shaped seeds, embedded in a soft fleshy pulp of a rich purple colour and a sharply acid flavour. The seeds are small for the size of the fruit, a feature not frequently occurring in wild fruits, but not uncommon in tropical Queensland. This plum, which is in perfection about July, is largely used by the settlers for making into jam and jelly, as well as an addition to pie-melon or pumpkin, to which it imparts an agreeable acid and rich colouring. By careful selection and cultivation this fruit might become a valuable addition to our cultivated kinds, but it is more suited to the tropical parts of the colony than the southern.

Diploglottis is a genus of Sapindaceæ containing two species, or one species with a well-marked variety. The first known is the large southern tree, more commonly called "Native Tamarind," *Diploglottis Cunninghamii*, Hook. The second species or variety is only met with in our tropical scrubs; this is *D. diphyllostegia*, F. v. M. It is a tree of much smaller growth, and retains a very largely distinctive appearance when grown with *D. Cunninghamii* in our southern gardens; its fruit is also smaller, and there is a slight difference in the time of the ripening of the fruit. As usual in this order, the part

of the fruit used is the juicy aril surrounding the seed, which is of a fleshy consistency, and possesses a sharply acid flavour, well suiting it for jam or jelly, for which purpose it is frequently used by settlers. The flavour of the preserve, when carefully made, is delicious, well repaying all the labour bestowed upon its preparation.

Eugenia, a large genus of the order Myrtaceæ in Queensland, furnishes several species whose fruits are used by the settlers for jam and wine making. Some of the kinds have received distinctive local names, as the "Endeavour River Pear," *E. eucalyptoides*, F. v. M. This forms a handsome small tree with drooping branches and long narrow leaves. The fruit is pear-shaped, about $1\frac{1}{2}$ inches long, and a diameter of over 1 inch at the larger end, rosy on the side exposed to the sun, the rest of a pale colour nearly white. The flesh is abundant and well-flavoured, and used by the settlers in the district where it grows for jam-making.

E. grandis, Wight, called "White Appie," is a large tree of tropical Queensland, which bears a great quantity of round, white, somewhat insipid fruit, 2 inches in diameter. This is used for jam-making by the settlers.

E. hemilampra, F. v. M.—During July and August trees of this species may frequently be met with in the Eumundi scrubs laden with fruit, which is well-coloured and sharply acid, and worthy the attention of settlers for jam and jelly making. A description of the tree is given in my Botany Bulletin No. 9.

E. Johnsonii, F. v. M.—Hitherto this species has only been met with in one locality in tropical Queensland. Its fruit has a subacid, aromatic flavour, and it is said to attain an inch or more in diameter, so when better known is likely to be utilised as the other kinds are.

E. myrtifolia, Sims., "The Scrub Cherry," is a small or large tree of Southern Queensland, which about August produces a large quantity of pretty red-coloured fruit of an agreeable flavour. This is collected and frequently utilised for jam and wine making. In September, 1894, fruit was abundant at Eumundi.

E. Tierneyana, F. v. M., and *E. Wilsonii*, F. v. M. (two tropical species), are largely used for jam-making in the districts where they grow.

The above six indigenous species are quite as well worthy of cultivation as such fruits as the well-known Brazilian Cherry—*E. uniflora*—which one meets in most Queensland gardens.

Amongst the forty kinds of our indigenous figs many are found with large fleshy fruits; but, unfortunately, these are so frequently infested with insect life as to unfit them for food. One, however—*Ficus gracilipes*, Bail.—is less troubled by insects, and is used for jam-making. The tree is of graceful habit, and an abundant fruit-bearer; the figs are nearly globose, about 1 inch in diameter, and prettily speckled, and the jam and jelly made from it are well-flavoured and sightly.

Garcinia.—This important genus of the order Guttiferæ was not known to have any representative in Australia until trees were found fruiting on the Bellenden-Ker Range in February, 1889; and even now, although another has been described by Baron Mueller from

specimens received from the Coen River, fruit alone of the first—*G. Mestoni*, Bail.—is known. This fruit is of a depressed globular form, attaining 3 or more inches in diameter, very juicy, and of a pleasant flavour. This is really a most valuable addition to our list of indigenous fruits, and one that should be brought under cultivation. The tree is of much more graceful habit than is usual in plants of this genus; the stem is slender, erect, the branches somewhat drooping, and the leaves somewhat like those of the willow. Some fruit of what may prove a third species was brought by Mr. A. Meston from near the same locality last year.

Leptomeria acida, R. Br., a broom-like shrub of the order Santalaceæ, is often abundant on the sandy lands of the coast and adjoining islands, and bears a small currant-like, acid fruit, which is often gathered and converted into jam by settlers living near where the plant grows wild. This plant is one of the earliest that was so used by the Australian colonists.

Nephelium.—Of the many Queensland species of this Sapindaceous genus, only one—*N. Lautererianum*, Bail.—deserves rank as a fruit. The part made use of is the fleshy aril which surrounds the seed. It is of a pale yellow colour, and has an acid flavour and agreeable taste, closely resembling the same substance which encloses the seed of *Diploglottis*, and like that makes a most delicious preserve. Neither, however, are likely to become articles of commerce on account of the care and labour required in gathering and preparing for use; but, as they form an additional delicacy for the table, we may hope to find this, amongst other indigenous fruits, utilised by the jam manufacturer.

Rhodomyrtus macrocarpa, Benth.—The fruit of this small tree is sometimes called "Native Loquat" or "Finger Berry," and is ripe about August. It is very similar to the *Eugenia*, and used for the same purpose.

Rubus rosæfolius, Linn., "The Queensland Raspberry."—The fruit of this plant is constantly used by the settlers in all parts of the colony where the plant is to be found. In flavour it is usually very insipid, but seems to be better in the tropics. Careful selection and cultivation would likely improve this plant, but I would again suggest, what I recommended many years ago, that it should be cross-fertilised with the cultivated kind—*R. Idæus*. When this was attempted, years ago, near Brisbane, it was found that the two kinds were not in flower at the same time, and that the cultivated plant did not thrive. But now with quick railway communication no difficulty would be found in obtaining perfect flowers of the cultivated raspberry from the cool parts of New South Wales in fresh and perfect condition for fertilising the flowers of the wild plant. The cross being thus obtained, we might hope to have the sound constitution of the wild plant with some of the rich flavour in the fruit of the old plant of cultivation. Perfection must not be expected at once, but by patience and perseverance I am confident that after a while a variety will be obtained nearly if not quite equal to the best cultivated kinds, and suitable to the Queensland climate.

Schizomeria ovata, D. Don., a small tree of Saxifrageæ, produces a fruit well worthy of attention. This plant forms a large shrub or

small tree. In the month of March, on the borders of scrubs in the Eudlo and Eumundi districts, the trees are seen laden with fruit, which is white, about the size of a cherry, juicy and acid.

Vitis.—This genus of the order Ampelideæ is represented in Queensland by about fifteen species. Settlers utilise the fruit of several for making jam and jelly. Those considered to be best suited for the purpose are *V. acetosa*, F. v. M., *V. nitens*, F. v. M., *V. opaca*, F. v. M., and *V. hypoglauca*, F. v. M.; the fruits of these being larger, more fleshy, and less acrid than others, although where these are not met with other species are used for the same purpose. By referring to my Botany Bulletin V., 10, it will be seen that I there expressed the opinion that two species are confused in the descriptions of *V. acetosa* given by Mr. Bentham and Baron von Mueller. That such a mistake should occur is not to be wondered at, for it is seldom that the describing botanist has good specimens of this genus to examine; these plants disarticulate so very freely in drying, and collectors' notes when given are often vague. Questions of this nature affecting our indigenous plants can never be satisfactorily settled until we have properly conducted botanic gardens—that is to say, gardens under the direction of botanists who have received horticultural training. Then these difficult, puzzling plants would be grown, their life history studied, and the results recorded for general information. Mr. Gardiner, of the Walsh River, when forwarding me specimens of *V. acetosa*, says that the bunches of this grape attain from 1 lb. to 2 lb. in weight when the plants are met with upon limestone country, and that the berries are large, with the appearance and pleasant flavour of the cultivated grape. Baron von Mueller recommended the trial of this vine in Victoria many years ago; but while there may be some doubt of its thriving so far south, there can be none as to its usefulness in tropical Queensland.

In the hope that some enterprising fruit-grower may be led to devote some little time and attention to improving and utilising our indigenous fruits, I am induced to extend somewhat this concluding paragraph upon the subject. The first object to have in view must be the improvement of the fruit, both with regard to size, productiveness, and flavour. The general austerity of even the best will have to be greatly reduced before we may hope that they will be received into cultivation. The first steps towards attaining these results will be a careful selection of the fruits from which to raise the first plants to experiment with, after which careful cultivation and further selection must be carried out under intelligent direction. Even by these means there is reason to hope that much may be achieved before resorting to cross-fertilisation. And this leads me to remind those who would experiment with our indigenous kinds of Vitis that, when referring to the wonders accomplished by the American fruit-growers in regard to the wild grapes of America, we must remember that the species which they (the Americans) have operated upon are much more closely allied to the grape of cultivation in Europe, *Vitis vinifera*, than those representing the genus in Australia. All ours belong to those formerly placed by botanists under a separate genus, named Cissus, differing as widely from the true Vitis as the American genus Ampelopsis, which the botanists of the present time also place under Vitis. I only make

these remarks to show that the American had fewer difficulties to contend with in improving the character of his native grapes than fall to the lot of the Australian experimentalist. Yet there is no reason why we should be disheartened or dissuaded from this work, but for our encouragement look back upon the changes which have been wrought by human agency, both in the animal and vegetable kingdom—changes which baffle belief. My advice with regard to improving our indigenous grape fruit is—first, that careful selection and cultivation be carried on; then cross-fertilisation with the improved forms so obtained between themselves, and afterwards with the American and European varieties. Another important use to which these forms and varieties might be put is that of stocks on which to graft or bud the approved kinds which we desire to multiply. It is impossible to over-estimate the value of a strong, healthy stock. Plants may be found to exist upon a number of others which may be related to them, but if you would have them thrive they must be furnished with healthy roots, and plants unsuited to the climate are never really healthy, either root or branch. I would, therefore, wherever such is possible, recommend that indigenous plants be used for stocks. In this I must be understood as referring particularly to Queensland. No part of Australia is so trying to exotic plant life. At times we are subject to long droughts, when the country becomes for months, or perhaps years, little better than a barren waste, during which the roots or seeds of the indigenous plants remain dormant or die out altogether. At other times there is a superabundance of rain, and the ground becomes saturated for a lengthened period. Such extremes, it will be seen, are most trying to plants of more regular climates; therefore many exotics are found to succumb, usually more from the wet than the drought, from the root-cells at such times absorbing more liquid than could be utilised. Therefore it would seem incumbent upon us, wherever practicable, to take advantage of the indigenous plants for stocks, for by so doing we obtain a healthy root, which is of the first importance. Following up this subject, I would strongly urge upon growers of fruits of the Orange family in Northern Queensland the advantage of cultivating the Russell River Lime, *Citrus inodora*, Bail., for stocks. In habit this species approaches much nearer to the cultivated kinds than the other indigenous species of Citrus. I should much like to see this new species brought into cultivation, so that its flowers might be fertilised by pollen from the best lemons and limes in cultivation, the object being to obtain a root more suitable to the climate, and still a first-class fruit. I may also remark, in passing, that this family does not take readily to cross-fertilisation, so that a failure now and again must be expected.

While on the subject of stocks for fruit trees, I would like some of our tropical fruit-growers to obtain from the scrubs of the Barron River young plants of *Pygeum Turnerianum*, Bail., and try the experiment of grafting upon them various kinds of plums. The genus Pygeum is very nearly allied to Prunus, and should the experiment prove a success it would be of great advantage to the tropical fruit-growers; and I see no reason why a union should not take place between these two plants, as in other natural orders far more dissimilar plants are used for stocks to graft and bud upon.

VII.—VARIEGATION AMONGST QUEENSLAND PLANTS.

As this diseased condition of the leaves and stems of plants is by the florists highly prized for decorative purposes, it may be well to notice those amongst our indigenous and naturalised plants which have been observed to be so affected. There have been many conjectures, but up to the present the cause of the disease is unknown. My friend, Dr. Thos. L. Bancroft, has observed that these variegated plants are more frequently to be met with amongst the young growth which springs up after a scrub has been burnt. I have usually found it on plants in small scrubs bordering creeks and rivers. It is found to take place at times in seedlings, but more frequently it occurs upon a single shoot or branch, when, if it is desired to perpetuate the form, resort must be had to the usual modes of propagation—viz., slips or cuttings, budding, grafting, layering, &c. It is seldom that one meets in the wild bush with a whole plant or even a large portion of a plant so affected, which is probably due to the more luxuriant growth of the healthy portion outgrowing and smothering these diseased parts. The florists, however, might find it to their advantage to look up and perpetuate many of the wild forms of this kind, for the marking and colouring at times are very effective. The following few plants, which have been noticed in a wild state to bear variegated foliage, are given to assist the lovers of these curious growths in their search:—

Genera and Species, Habitat, Local or Aboriginal Name, and Order, respectively:—

Malvastrum tricuspidatum, A. Gray; Brisbane; Malvaceæ.

Hibiscus tiliaceus, Linn.; Coast; Cotton-tree, Talwalpin of the natives of Moreton Bay and Johnstone Rivers; Malvaceæ.

Corchorus Cunninghamii, F. v. M.; Enoggera; Tiliaceæ.

Acronychia lævis, Forst.; Taylor's Range; Rutaceæ.

Rubus rosæfolius, Sm.; Brisbane River; Raspberry; Rosaceæ.

Tabernæmontana orientalis, R. Br., var. *angustifolia*, Benth.; Enoggera; Apocynaceæ.

Lantana camara, Linn.; Enoggera; Verbenaceæ.

Amarantus paniculatus, Linn.; Brisbane; the leaves yellow and green; Amarantaceæ.

Trema aspera, Blume; Kelvin Grove; has also been met with on the Johnstone River; the Peach-leaf Poison Bush; Urticaceæ.

Cudrania javanensis, Trècul, var. *Bancroftii*, Bail.; Kelvin Grove and Deception Bay; has also been met with on Johnstone River; Cockspur Thorn; Urticaceæ.

Geitonoplesium cymosum, A. Cunn.; Bank of Brisbane River; Liliaceæ.

Cordyline terminalis, var. *Baileyi*, Bail.; Pimpama; Liliaceæ.

Commelyna cyanea, R. Br.; Spiderwort; Commelynaceæ.

Pollia macrophylla, Benth., var. *crispata*; Eumundi; Commelynaceæ.

Bacularia monostachya, F. v. M.; Eumundi; Midgeen, or Walking-stick Palm; Palmæ.

Archontophœnix Cunninghamii, Wendl.; Piccabeen of the natives; Palmæ. Some young plants of this palm, which were received by Mr. Soutter from Eudlo, show upon making a fresh growth variegated leaves.

Oplismenus compositus, Beauv.; Gramineæ.

Ageratum conyzoides, Linn.: Brisbane; Billygoat weed; Compositæ.

Bidens pilosa, Linn.; Brisbane; Blackfellows; Compositæ.

Galinsoga parviflora, Cav.; Brisbane; Yellow weed; Compositæ.

VIII.—COLOUR SUPPOSED ABNORMAL.

Under this heading I record some few instances, which have come under the observation of myself or of some fellow-worker, of plants found in the wild state to produce white flowers, whereas the species, from which they are but accidental sports, have, in the normal state, flowers of some dark colour. These unaccountable freaks of nature are frequently of value for garden culture, particularly as they are in some cases capable of being perpetuated by seed, cuttings, &c. I think it would be advantageous were botanists to make a rule, whenever these sports are met with, to describe and name them as varieties; this would be making a legitimate use of nomenclature, and would prove of great convenience and advantage to the horticulturist. In the Flora Australiensis instances several times occur of such plants being recorded as named varieties, as, for instance, *Utricularia cyanea*, var. *alba*. This, however, was not always carried out in that work, for we find many instances similar to this—"*Comesperma volubile*; flowers blue or rarely white." In this place, as in the former, the blue and the white flowers are borne upon two distinct plants, so, in my opinion, it would have been better had the white-flowered plant been given as *Comesperma volubile*, var. *album*. With these few remarks I pass on to mention plants of this nature which have been observed in Queensland since the issue of the volumes of the Flora Australiensis.

Genera and Species, Local or Aboriginal Name, and Order, respectively :—

Viola betonicæfolia, Sm.; Large Violet; Violarieæ. White flowering plants of this violet have been met with near Brisbane.

Hibiscus rhodopetalus, F. v. M.; Malvaceæ. A plant of this species has lately been met with at Mackay, which produced white flowers. This has been brought into garden cultivation.

Stylidium graminifolium, Sw., var. *album*, Bail.; Hair-trigger plant; Stylidieæ. Found near Cleveland, South Queensland.

Artanema fimbriatum, Don., var. *album*, Bail.; Scrophularineæ. Met with near Bundaberg by J. Keys.

Dendrobium bigibbum, Lindl.; Orchideæ. At Cape York there is said to be a white variety.

Dipodium punctatum, R. Br., var. *album*, Bail.; Orchideæ. On sandy land near the coast, near Cleveland, this variety was obtained a few years ago.

Doryanthes excelsa, Correa.; Amaryllideæ. A variety with white flowers is reported to have been met with on Mount Lindsay.

Commelyna cyanea, R. Br.; Commelynaceæ. I have not seen them, but am informed that this species has been seen bearing white flowers.

Aneilema gramineum, R. Br.; Commelynaceæ. Plants of this species with white flowers have been met with near Brisbane.

Xyris pauciflora, Willd., var. *albiflos*, Bail.; Xylideæ. A small variety found on Fraser Island with white flowers.

Other deviations from the supposed normal colours have been observed in the following:—

Clematis Fawcettii, F. v. M., var. *purpurascens*, Bail.; Ranunculaceæ. This is a form met with at Killarney, the flowers of which have quite a purplish tinge.

Elæocarpus cyaneus, Ait.; Tiliaceæ. Plants of this species have been met with near Stanthorpe with rose-pink flowers.

Citrus australasica, F. v. M., var. *sanguinea*, Bail.; Rutaceæ. This is a form found upon Tambourine Mountain, of which the fruit is blood-red.

Dendrobium Kingianum, Bidw., var. *pallidum*, Bail.; Orchideæ. Some plants of this form bear nearly white flowers.

Dendrobium undulatum, R. Br., var. *Broomfieldii*, Fitzg.; Orchideæ. The flowers of this form are of a more or less bright yellow.

Dendrobium teretifolium, R. Br., var. *aureum*, Bail.; Orchideæ. The flowers of this form found at Killarney are of a bronze or yellow colour.

Dipodium punctatum, R. Br., var. *Hamiltonianum*, Bail.; Orchideæ. Of this form, which has been met with at two very distant habitats—viz., the islands of Moreton Bay and about Stanthorpe—the ground colour of the flower is yellow.

Chrysopogon parviflorus, Benth., var. *flavescens*, Bail.; Gramineæ. This lovely and very distinct form is in some localities upon the Darling Downs plentiful. Instead of the usual purplish colour the inflorescence is of a pleasing yellow.

The mentioning of this grass leads me to express regret that neither Baron von Mueller nor Mr. Bentham could see their way to retain the names, or at least some of them, given by former botanists to the grass recorded in the Flora Australiensis as *Pappophorum nigricans*, R. Br., and by Baron von Mueller as *P. commune*, F. v. M. The names discarded by these two botanists—viz., *pallidum*, *purpurascens*, *gracile*, *cœrulescens*, *flavescens*, and *virens*—would have admirably suited for the names of the several varieties met with in Queensland; and doubtless when our grasses are collected and brought under cultivation, such will be brought into use again as distinctive names for these varieties or forms.

IX.—PLANTS RECENTLY FOUND TO CONTAIN HIGHLY POISONOUS PROPERTIES

In my remarks in the opening part of this paper, I said that our Flora contained but few plants of a hurtful or dangerous character; and although such is true, yet amongst the plants are found some possessing powerful active principles which have been proved highly poisonous. Some, indeed, are stated by my friend, Dr. Thomas L. Bancroft, in papers read at meetings of various societies, to equal in virulence that of the most deadly of vegetable toxicants. This gentleman has for some years past paid particular attention to the properties of Queensland plants, and I shall be content in this paragraph to

mention some of our plants which he has found to possess poisonous properties which, it would seem, were previously unknown to have toxic properties.

Stephania hernandiæfolia, Walp., and *S. aculeata*, Bail. An extract of the roots of these, he says, is extremely poisonous; and he found that the root bark of *Cocculus Moorei*, F. v. M., and *Sarcopetalum Harveyanum*, F. v. M., also contained active poisonous principles.

Carissa ovata, var. *stolonifera*, Bail. The bark of this form he found to possess highly poisonous properties.

Marlea vitiensis, Benth. Extract of the bark is described as poïsonous.

Zanthoxylum veneficum, Bail. This contains a poisonous principle equal in strength, and somewhat similar in action, to strychnine. *Melicope erythrococca*, Benth., contains a somewhat similar poisonous principle which the doctor terms a protoplasmic poison.

Flindersia Schottiana, F. v. M. The bark of this tree contains a poisonous principle.

Daphnandra micrantha, Benth.; *D. repandula*, F. v. M.; and *D. aromatica*, Bail. Each contains in the bark highly poisonous properties.

Cryptocarya australis, Benth., and *C. triplinervis*, R. Br., also contain in their barks an alkaloid of great potency as a poison, which in its action resembles Curara.

X.—NODULES.

These curious wood formations, which are known to form in the bark of the olive and other European trees, have so far in Queensland been met with in the bark of few trees. The Bunya Pine, *Araucaria Bidwillii*, Hook., produces them, and, as may be supposed in a tree with a bark from 6 inches to 18 inches thick, they attain a great size. The nodule wood takes a high polish, and is very beautiful both in figure and colouring, and should command a high price for veneering work. *Araucaria Cunninghamii*, Ait., is also said to furnish them as large as cricket balls; these, however, I have not seen. They are very numerous in the bark of *Cinnamomum Oliverii*, Bail., attaining a diameter of 2 inches or 3 inches.

XI.—NATURALISED PLANTS, AND STRAYS FROM CULTIVATION.

It would take up far too much space, and be undesirable, to give in this paper a full list of the names of the plants which have become naturalised or which have strayed from cultivation, and are now found growing spontaneously upon the waste lands near settlement. But it may be here stated what proportion each quarter of the globe has furnished of the 200 or so plants constituting the naturalised portion of the Queensland Flora. Some of the plants may almost be called cosmopolitan, but the following is a fair statement:—About one-third are European, about one-third are from America, about one-fifth are Asiatics, but the African species only amount to about one-thirteenth. The plants are contributed by 46 orders, in the following manner:—35 orders furnish from 1 to 5 each, 7 orders from 6 to 10 each. The largest contributors are Solanaceæ 15, Leguminosæ 20, Gramineæ 21, and Compositæ 24.

While it is important that we should duly record all plants which from time to time may be observed to have naturalised themselves in our colony, it is of equal importance that attention be directed in the opposite direction. Have any of the indigenous plants become scarce or been lost, or have any species of the introduced ones, after overrunning a portion of the country, disappeared? The only instance of this kind of which I can think is that pretty little water-weed, *Hydrocharis morsus-ranæ*, Linn. About twenty years ago this plant was most abundant in the still waters around Brisbane, but for the past fifteen or more years I have not met with a single specimen; and although it may still be plentiful in some localities, I know of no Queensland habitat of the plant, and this favours my former opinion that the plant was an introduction.

XII.—DECIDUOUS TREES.

Evergreen trees predominate, as a rule, in all hot or warm climates, and we find this to be the case in Queensland. Our deciduous trees are few in number, and the fall of the leaf, in most cases, is so uncertain that the term "semi-deciduous" would be a better term to apply to them. For while one tree of a species may be found quite bare of leaves, another by its side may be seen full of leaf, with nothing to distinguish it from a purely evergreen species. The following constitutes the majority of our trees of this character—a small proportion, considering that the Queensland Forest Flora cannot number less than 1,000 small or large trees:—

Cochlospermum Gillivræi, Benth.; Order Bixineæ.

Bombax malabaricum, DC., Silk Cotton Tree; Order Malvaceæ.

Sterculia quadrifida, R. Br.; *S. discolor*, F. v. M.; *S. trichosiphon*. Benth.; *S. acerifolia*, A. Cunn.; Order Sterculiaceæ.

Melia composita, Willd., White Cedar; Order Meliaceæ.

Cedrela Toona, Roxb., Red Cedar; Order Meliaceæ.

Sesbania grandiflora, Pers.; Order Leguminosæ.

Erythrina indica, Lam., Coral Tree; *E. vespertilio*, Benth., Cork Tree; Order Leguminosæ.

Castanospermum australe, A. Cunn.; Moreton Bay Chestnut or Bean Tree; Order Leguminosæ.

Albizzia procera, Benth.; Order Leguminosæ.

Eucalyptus platyphylla, F. v. M., Poplar Gum; Order Myrtaceæ.

Sarcocephalus cordatus, Miq., Leichhardt Tree; Order Rubiaceæ.

Ficus colossea, F. v. M.; *F. Cunninghamii*, Miq.; Order Urticaceæ.

By Authority: Edmund Gregory, Government Printer, William street, Brisbane.

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BOTANY BULLETIN No. XIII.

APRIL, 1896.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

BY AUTHORITY: EDMUND GREGORY, GOVERNMENT PRINTER, WILLIAM STREET.

1896.

PREFATORY NOTICE.

To those who have noticed my various publications it will have been observed how anxious I am to record all that is known relative to the economic and medicinal properties of the plants brought under my notice as well as their botanic distinctions. My pleasure may then be in a small degree imagined at the great kindness of my esteemed friend, Dr. Joseph Lauterer, in placing in my hands, for publication in one of these Botany Bulletins, the present valuable notices of the chemical and medicinal properties of so large a number of our indigenous gums and resins. The samples from which the results have been obtained were in a great many instances taken from exhibits in the Museum of Economic Botany; therefore, I can with confidence vouch for their authenticity. The want of such a publication has long been felt by artisans who use the several products herein mentioned, and I feel confident they will fully appreciate the many long hours spent by Dr. Lauterer in working out by original research the careful details regarding the gums and resins of the trees brought under notice, and hope with me that he will continue his researches and allow the results of his labours to be published in this manner. I take the present opportunity of expressing my thanks to those persons who have kindly forwarded to me samples of gums and resins of the native trees from the various parts of our extensive territory, and hope that as opportunities occur they will continue their aid in this good work.

F. M. B.

1st *October*, 1895.

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To which is added a descriptive paper on the Chemistry and Economic Properties of a number of Queensland Gums and Resins, by Dr. Joseph Lauterer.

BOTANY:
CONTRIBUTIONS TO QUEENSLAND FLORA.

Order VIOLARIEÆ.

IONIDIUM, Vent.

I. aurantiacum, *F. v. M.*, Flora Austr. i. 102. A much-branched scabrous-pubescent under-shrub, branchlets angular; leaves linear-lanceolate, 1 to 1½ in. long, veins few, the margins often with few distant laciniæ. Flowers yellow, more or less tomentose, on short axillary peduncles; the claw of lower petal, including the gibbous base, rather longer than the lamina; filaments and appendages bearing scattered hairs. The anther appendage broad and brown. Seeds dotted-striate, but not so prominent as in *I. suffruticosum*.

Hab.: Glenormiston, Georgina River, *J. Coghlan*.

Order MALVACEÆ.

SIDA, Linn.

S. inclusa, *Benth.*, Flora Austr. i. 197. A shrub, densely velvety tomentose, or almost floccose. Leaves ovate or orbicular, often cordate, obtuse, crenate, mostly 1 in. long. Flowers solitary in the axils. Peduncle and pedicel about 6 lines each long; the former thinner than the latter and not so hairy. Calyx broadly campanulate, 3 or 4 lines long; lobes bluntly-apiculate, 3-ribbed. Petals yellow, longer than the calyx; the margins at the base bearing long white hairs. Stamens 15 or more, the free part reflexed; tube short, broad, and bearing on the outside long, scattered, white hairs. Style with branches about the length of the stamens. Ovary 1½ line in diameter, depressed-orbicular, the top densely tomentose, sides tuberculose. Fruiting calyx membranous, inflated to about 1 in. diameter, completely enclosing the fruit. Carpels numerous, stellate-hirsute, echinate, with rather soft hirsute spines, forming a depressed orbicular fruit of nearly 1 in. diameter.—*Benth. l.c.* in part.

Hab.: Glenormiston, *J. Coghlan*. The specimens received from Mr. Coghlan were fragmentary, but from them I have been enabled to give a description of the flowers which was wanting.

Order RUTACEÆ.

Tribe ZANTHOXYLEÆ.

PAGETIA, F. v. Muell.

P. monostylis (n. sp.) An erect glabrous tree of about 60 ft. in height, with a rather smooth whitish bark; branchlets usually ternate, flattened, green, and cane-like, smooth except for the numerous lenticels; internodes long. Leaves opposite, mostly 1-foliolate with very short petioles, oblong, 4 to 6 in. long, 1½ to 2½ in. broad, base usually cuneate, apex often abruptly acuminate, blunt; the first

leaves of the young growth are represented by linear, membranous bud-scales about 1 in. long, 2 lines broad, and very deciduous; the pair of leaves under the inflorescence are 2 or 3-foliolate, the lateral leaflets often oblique at the base, and nearly or quite sessile, lanceolate, about 3 in. long. Flowers white, in terminal trichotomous, corymbose panicles, peduncles flattened, pedicels hairy. Bracts minute, hairy. Sepals about $\frac{1}{2}$-line long, tomentose. Petals tomentose, 2 or 3 lines long. Stamens 10, filaments flattened, glabrous. Disk a glabrous, thick, slightly-lobed ring. Ovary hairy, of 5 pustulate lobes. Style glabrous, shorter than the stamens, stigma capitate, globose, slightly sulcate. No ripe fruit obtained.

Hab.: Eumundi, *Field Nat. Excursion*, Nov. 1895. This graceful tree differs from *P. medicinalis*, F. v. M., in having narrow oblong not broadly-ovate leaves; the oil-dots are more prominent also in this fresh species. The flowers also have but one style. Further distinction will probably be found in the ripe fruit. The foliage will be obtained and distilled for its oil, that it may be tested for medicinal virtues said to be contained in the leaves of the northern tree.

Order SIMARUBEÆ.

SAMADERA, Gærtn.

Calyx small, 3-5-partite, imbricate. Petals 3-5, much longer than the calyx, coriaceous, imbricate. Disk large, conical. Stamens 8-10, included in the corolla, with a small scale at the base. Carpels 4-5, distinct, free; styles free at the base, more or less united above, stigmas acute; ovules solitary, pendulous. Fruit of 1-5 large, dry, compressed 1-seeded drupes, each with a narrow unilateral wing. Large or small trees. Leaves simple. Flowers hermaphrodite, in peduncled axillary or terminal umbels.—Hook., Flora of British India i. 518.

The two Australian trees—viz., *Hyptiandra Bidwilli*, Hook., f. Flora Austr. i. 374, and *H. B.* var. *grandiuscula*, Bail. and F. v. M., 3rd Suppl. Syn. Ql. Flora 12—have been re-examined by Professor D. Oliver, and the description and figures published in Hooker's "Icones Plantarum," under Nos. 2449 and 2450, as *Samadera Bidwilli*, Oliv., and *S. Baileyana*, Oliv.

Order SAPINDACEÆ.

CUPANIA, Linn.

C. foveolata, *F. v. M.*, Fragm. ix. 95. A tree attaining about 40 ft.; bark somewhat smooth, wood hard. Branchlets, petioles, and peduncles slightly puberulent. Leaves with from 5 to 13 leaflets, rhachis angular; the leaflets oblong-lanceolate, from 3 to 6 in. long and $\frac{3}{4}$ to $1\frac{1}{4}$ in. broad, thin, coriaceous, shortly decurrent upon the petiolule, the apex elongated but blunt, glabrous on both faces, the under of somewhat paler colour, repando-crenate, the principal veins on the underside with dimples in their axils. Branches of panicles angular. Sepals rather large, nearly glabrous; inner ones roundish, $1\frac{1}{2}$ to 2 lines long. Petals minute, bearing auriculate hairy scales at their base. Stamens 8. Filaments longer than the calyx, slightly tomentose. Anthers oval, $\frac{1}{2}$-line long. Disk crenulate, silky-tomentose as well as the ovary. Capsule about $\frac{3}{4}$ in. 3-angular-globose woody; the outside silky-tomentose, the inside woolly. Seeds nearly covered by the arillus.

Hab.: Various localities in tropical Queensland, *Carron, Dallachy, and W. Hill.*

Order LEGUMINOSÆ.

JACKSONIA, R. Br.

Series PHYLLODINEÆ.

Branchlets either barren or flower-bearing, phyllodineous, flat, rigidly coriaceous, toothed or lobed, often pungent.

J. dilatata, *Benth.*, Flora Austr. ii. 54. An erect shrub, silky-pubescent or tomentose (or at length more or less glabrous), more or less rust-coloured under the inflorescence. Branchlets leaf-like, flat, lanceolate, 1 to 4 or more inches long, the nodes forming tooth-like notches on the edges with an arched nerve from the midrib to each node. Flowers sessile, in oblong spikes or heads at the ends of some of the leaf-like branchlets, which taper more to the end than the barren ones. Bracts ovate, scale-like, 1 to 1½ lines long; bracteoles often longer and lanceolate, all very deciduous. Calyx villous, about 3 lines long. Standard about as long as the calyx, lower petals shorter. Ovary very shortly stipitate. Pod ovate (silky), shorter than the calyx (containing one black seed).—*Benth. l.c.*, except the words bracketed which refer to Mr. M. Costello's specimen.

Hab.: Lake Nash, *M. Costello.*

ACACIA, Willd.

A. georginæ (n. sp.) Georgina Gidgee. A large shrub or small tree, with dense spreading head. Has a strong disagreeable scent. Branches and trunk usually very crooked, bark thick and rough; young branchlets flattened or triangular, and, like the foliage, all more or less clothed with a hoary tomentum. Phyllodia lanceolate-falcate, 2½ to 3½ in. long, 3 to 4 lines broad, much narrowed towards the base, and bearing at the apex a small, thickened, oblique point; texture thick, hard and brittle; the parallel nerves 2, 3, or 4, but like the finer veins often very obscure from the thick substance of the phyllodia. Flowers not available. Pod falcate or curved into a circle, very obtuse at each end; thin, flat, wavy, and elegantly marked with branched reticulate veins, 2 or 3 in. long, ¾-in. broad. Seeds few, distant, transverse, very flat, about 5 lines broad, surrounded by a narrow wing-like border, glossy-brown, funicle thickened into a narrow clavate aril, below which are 1 or 2 folds. (Plate IV.)

Hab.: Georgina River. This new species closely resembles *A. homalophylla*, A. Cunn., the phyllodia being the same in form, and possessing the same disagreeable odour. In pod and seed the resemblance approaches *A. pendula*, A. Cunn, from which the distinction is also considerable. The plant is the one which, under the name of Gidgee, was reported to have caused the death of a number of fat cattle on Roxborough Downs.

Order HALORAGEÆ.

HALORAGIS, Forst.

H. tetragyna, var. glabrescens. This western plant differs from the several other forms in being nearly or quite glabrous. The stem-angles are smooth. The leaves large, bordered by distant prominent teeth and serrulate between them. The flowers are larger than in other forms.

Hab.: Darr River, *C. W. de Burgh Birch.* Diamantina, *Dr. Thos. L. Bancroft.* Georgina, *F. M. B.*

Order MYRTACEÆ.

EUGENIA, Linn.

E. punctulata (n. sp.) Tree often tall, branchlets somewhat compressed approaching 4-angled. Leaves subcoriaceous, broadly lanceolate, the apex obtusely acuminate, tapering towards the base and almost sessile, attaining a length of 3½ in. and 1¼ in. width in the centre, the lateral veins almost transverse, the upper surface in the dried specimens closely covered by sunk dots. Flowers in axillary or terminal very short panicles of sessile flowers. Calyx-tube about 5 lines long, pear-shaped and often somewhat angular, produced above the ovary, lobes 4, unequal, the larger ones about 2 lines broad. Petals about twice the size of the calyx-lobes separately deciduous. Stamens flexuose and not much longer than the petals. Style about as long as the stamens. Fruit bright-red, and more or less lobed near the top, juicy, about ¾ in. diam. Seeds few.

Hab.: Eumundi, *R. D. Power*, 1894, in fruit; *J. H. Simmonds*, in flower June, 1895. I have also a specimen gathered by the late Rev. B. Scortechini, without note of locality.

Slips with the above description were issued June, 1895.

Order COMPOSITÆ.

CALOTIS, R. Br.

Section Cymbaria.

C. erinacea, *Steetz*, Flora Austr. iii. 502. A glabrous often glaucous perennial, with erect or ascending rigid branching stems of 1 to 2 ft. Leaves not numerous, linear or linear-lanceolate, acute, entire, or the lower ones toothed (the Queensland specimens often over 1½ in. long, and except those near the flowers sharply toothed throughout). Flower-heads pedunculate. Involucral bracts oblong or linear, slightly scabrous, 1 to 1½ lines long. Ray-florets yellow. Fruiting-heads 3 to 4 lines diameter. Achenes glabrous, smooth or nearly so, with 3 to 5 awns scarcely or shortly barbed and united at the base into a broad open almost cartilaginous cup, often as long as the achene, and the border sinuate between the awns; the summit of the achene within the cup conical with a few minute bristles.—*Bentham l.c.*

Hab.: Near Charleville, *J. Henderson.*

Although this "bur" is met with in New South Wales, Victoria, South Australia, and West Australia, it has not before, I believe, been found in Queensland. As a Bur-plant it is less obnoxious than many others of this genus.

OLEARIA, Mœnch.

O. ramosissima, *Benth.* *Aster cyanodiscus*, F. v. M., Cens. of Austr. Pl. A shrub of 2 or 3 ft. with numerous rather slender branches, scabrous-pubescent, mixed with a little loose wool. Leaves minute, reflexed, clustered in the axils, lanceolate or linear, entire, with revolute margins, all under 1 line long or rarely the larger ones narrow and nearly 2 lines long, glabrous and smooth or scabrous above, with a thin loose wool underneath. Flower-heads solitary at the ends of the branchlets, forming an oblong or rarely corymbose leafy panicle. Involucre broadly turbinate, about 3 lines long, the bracts often coloured and jagged at the edge. Florets all blue, those of the

rays 12 to 15, more numerous in the disk and longer than the involucre. Achenes more or less villous. Pappus white, with a few short outer bristles.—Flora Austr. iii. 479.

Hab.: Stanthorpe district, *T. Kirkland.* I have also specimens of this plant which were collected by A. Cunningham, at Dumaresq River in 1827. The species was also collected in New South Wales by A. Cunningham, C. Fraser, and C. Stuart.

Order APOCYNACEÆ.

Tribe PLUMERIEÆ.

OCHROSIA, Juss.

O. Poweri (n. sp.) (After R. D. Power, a resident in the district, from whom a specimen of the fruit was first obtained in 1894.) A glabrous small tree or tall shrub, branchlets dichotomous. Leaves opposite, oblong-lanceolate, acuminate, about 4 or 5 in. long, narrowing to a petiole of 2 or 3 lines; apex blunt but more or less elongated, smooth on both sides, the under somewhat paler in colour, midrib broad, transverse veins only faintly visible, although the texture of the leaf is not thick. Flowers in dichotomous cymes terminating the branchlets; primary peduncle very short, often scarcely exceeding 1 line in length; secondary peduncles about ½-inch long, frequently only one of these produced, which are again forked or bear 2 or 3 nearly sessile or shortly pedicellate flowers at the end. Bracts and bracteoles minute with scarious margins. Calyx-segments 5 or 6, obtuse, thickened in the centre, the margins transparent. Corolla not seen. Ovary glabrous. Fruit 2, drupe-like (or 1 by abortion), bright-red, ovoid-oblong, acuminate, nearly terete, 12 or 13 lines long, endocarp nearly smooth. Seed similar in shape to the fruit, flat, about half the length of the fruit, only one in the specimen examined. Flowers are much desired.

Hab.: Eumundi, *Field Nat. Excursion,* Nov. 1895. This new species resembles *O. Moorei*, F. v. M., in having opposite leaves, but differs from the description given of that or any other species known to me.

Order BIGNONIACEÆ.

HAUSSMANNIA, F. v. M.

H. jucunda, *F. v. M.* Capsule 3 to 4½ in. long and nearly 1½ in. broad, tapering towards both ends, outside smooth, opening loculicidally in 2 very concave valves, as in *Tecoma*; the seeds also overlaying each other in several rows, as in that genus. Seeds flat, pyriform, wrinkled, surrounded by a membranous wing which is elongated on either side to nearly half-an-inch, and broad as the seed which occupies the centre between them. Dissepiment broad, thick, and seems more firmly attached to the valves or one of them than usually in other plants of this order.

Hab.: Freshwater Creek, Cairns, *L. J. Nugent.* I believe this is the first time that fruit of *Haussmannia* has been found.

Order PEDALINEÆ.

MARTYNIA, Linn.

M. proboscidea, *Glox.* Unicorn plant. A coarse heavy-scented annual. Leaves cordate, roundish, often oblique, entire or obscurely undulate-lobed, 4 to 12 in. in diameter. Bracts oblong linear.

Corolla 1½ to 2 in. long, dull white, spotted within with some yellow or purple, also varying to light-yellow; endocarp crested on the posterior suture only.

Hab.: Warwick; naturalised. Native country, Mexico. The stigmatic lobes of the flower said to close when touched.

Order EUPHORBIACEÆ.

EUPHORBIA, Linn.

E. Muelleri, *Boiss.*, Flora Austr. vii. 48. "A dwarf plant with a thick woody rhizome and procumbent or ascending rather rigid stems of 1 to 2 in., densely pubescent with short hairs or nearly glabrous. Leaves opposite, nearly sessile, rather crowded, ovate orbicular or the upper ones oblong, rather thick entire, 2 to 5 lines long, very oblique at the base, and the lower ones sometimes broader than long. Flower-heads larger than in *E. australis* and *E. Drummondii*, solitary and pedicellate in the upper axils, forming almost a terminal leafy cyme. Involucre about 1 line long, glabrous or pubescent. Capsule 1½ lines long, glabrous or shortly hairy. Styles short. Seeds irregularly rugose."

The foregoing is the description given in the above work, from which the Georgina River specimens seem only to differ in a few minor points.

Hab.: On the limestone country about Roxborough Downs.

E. Coghlani (n. sp.) (After J. Coghlan, to whom I am indebted for many specimens of Georgina plants.) A small virgate shrub of 1 to 2 ft. with dichotomous branches, which are glaucous and more or less covered with short white hairs. Leaves opposite, shortly petiolate, 3 to 6 lines long, oblong to ovate, obtuse or apiculate, often bearing on the veins hairs similar to those on the branches, very unequal-sided at the base, margins nearly entire or sharply toothed, parallel veins 3 or 5 starting from near the base; texture somewhat coriaceous. Stipules rather long, tapering from the base, filiform-plumose, very deciduous. Flower-heads shortly pedicellate, in rather loose irregular cymes, terminal upon the upper branchlets. Involucres small as well as the bracts, the petal-like appendage of the involucral glands ¼-line broad, nearly orbicular, entire, white or slightly coloured. Capsule 3-lobed, about 1½ lines broad. Styles recurved, divided to about the middle. Seeds pruinose, quite smooth.

Hab.: Limestone ridges of the Georgina River. This new species differs from most other Australian species in its smooth seeds. In habit it approaches somewhat to *E. filipes*, Benth., but forms a much more rigid bush than that species.

Order ORCHIDEÆ.

PHAIUS grandifolius, Lour.

I am led to make a few remarks upon this superb species, in order to draw attention to a form now (October) blooming in the bush-house at Bowen Park. Mr. W. Soutter tells me that he found the plant on Stradbroke Island some years ago, at which time it was bearing what are termed double flowers. These abnormal growths occur less frequently in orchideous genera than in genera of other orders; and while this malformation gives a fulness to the blooms, it

cannot be said to add to the beauty of the flowers so distorted. This orchid is recorded in European works as producing similar flowers in other countries; but I cannot find any notice of its being peculiar to certain individual plants, which has been proved by Mr. Soutter, who now has the plant he first found bearing, amongst blooms of the normal form, several of the so-called double flowers. These are of the same colouring as the normal form, and the segments are of the usual form and size. The change takes place in the wings of the column; these are greatly enlarged and overlap each other on the face of the labellum, and end in a kind of spur at the base; the outer margin is very wavy, and thus resembles the labellum, and the resemblance is the more obvious as the colouring is the same. The attachment of these abnormal wings seems to be somewhat irregular; in the flower I dissected, on the one side the wing was attached only for about half the length of the column, the other was attached from the bottom to the top of the column. The column, like that of the yellow flowering variety (*Phaius grandifolius*, var. *Bernaysii*), shows a tendency to become triandrous.

The lesson we learn from Mr. Soutter's plant is that these malformations are, as regards plants of *Phaius*, persistent and may be perpetuated, and the number of plants increased in the usual way if considered desirable.

Order PALMÆ.

CALAMUS, Linn.

Our indigenous species of this genus are sufficiently described as to the distinctive characteristics of the smaller species of "Lawyer-cane"—*C. Muelleri* and *C. caryotoides;* but such is not the case with the "Large Lawyer-cane," known to the botanist as *C. australis.* Under this name are, I believe, confused three distinct species; and in support of this, Mr. E. Cowley tells me that the aborigines at the Barron River also distinguish three kinds by name—viz., "Moti," "Jaboolum," and "Moologum." From Mr. Cowley I have stem and foliage specimens, and a promise of flower and fruit specimens when available. I should, however, be glad to receive specimens from Fitzroy Island, the locality where A. Cunningham and J. McGillivray's specimens were obtained, as well as from Rockingham Bay, where J. Dallachy collected his. The specimens of these collectors being the only ones known up to the time of the publication of the "Flora Australiensis." If, as I surmise, the distinctions between these plants prove of specific character, I would suggest arranging them as follows:—

C. obstruens, *F. v. M.*, for perhaps the Fitzroy Island and Rockingham Bay plant; for Bentham's description of this in the "Flora Australiensis" most certainly does not agree with any of the Barron River species.

C. Moti, *Bail.* Stems reclining, but ultimately climbing to a great height. Leaves 6 or 7 ft long, including the petiole, which without the sheath is about 2 ft. Segments linear-lanceolate, 20 in. long, 1 in. broad, of 40 or more nearly opposite pairs; longitudinal ribs 5, beset with fine dark setæ; margins with minute distant teeth. Rhachis and petiole armed with recurved prickles; those of the sheath long flattish, of irregular length, dense or in more or less false-whorls.

C. Jaboolum, *Bail.* Stems reclining, but ultimately climbing to a great height. Leaves about 4 ft. including the petiole, which is usually under 6 in. long, flattish, bearing upon the margins and upper surface long thin needle-like prickles of a somewhat blackish hue, often glossy and attaining a length of 3 in.; segments often nearly opposite, of about 25 pairs, 12 to 15 in. long and 1¼ in. broad, narrow-lanceolate, longitudinal ribs often numerous, as many as 12 and very rarely bearing here and there an odd prickle, the margins armed with numerous sharp approximate prickles; sheaths densely covered with dark-brown or black needle-like prickles 1 or more inches long. Rhachis bearing stout recurved prickles.

Order CYPERACEÆ.

CYPERUS (PYCREUS), Linn.

C. flavicomus, *Mich.;* Kunth. Enum, ii. 15, Flora Austr. vii. 261. A tall perennial. Stems prominently 3-angled, 2 to 3 ft, high. Leaves much shorter, rather narrow. Umbel large and loose, often compound, the longer rays often 4 to 6 in. long, with numerous spikelets distichously spicate along the partial rays. Involucral bracts 3 or more, of which 1 or 2 much longer than the inflorescence, and the lowest sometimes 4 or 5 lines broad. Spikelets spreading, lanceolate, flat, ½ to 1 in. long, and at length 2 lines broad, 12 to 20-flowered, the angles of the rhachis bordered by a narrow hyaline wing. Glumes spreading and quite distinct, giving the spikelet a pinnate appearance, broad, obtuse, the keel green, the sides smooth or pale and always bordered by a white hyaline margin. Stamens 3, style 2-cleft. Nut broad, flat with one edge next the rhachis, nearly as long as the glume.—*Benth. l.c.* *Pycreus albomarginatus,* Nees, in Hook. Flora of Brit. Ind. vi. 594.

Hab.: Roxborough Downs, Georgina River.

Order GRAMINEÆ.

PANICUM.

P. jubiflorum, *Trin.* Referred to in Flora Austr. vii. 475. This excellent fodder grass seems to hold a position between *P. flavidum,* Retz., and *P. gracile,* R. Br., and probably should be placed as a named variety of the latter. It is a glabrous leafy grass, with numerous erect stems of 3 or 4 ft. in height, the terminal inflorescence occupying about one quarter of the stem's length. The spikes arranged as in *P. gracile,* but longer, and the spikelets larger.

Hab.: Darr River, *C. W. de Burgh Birch.* Georgina River, *J. Coghlan.*

CHLORIS, Linn.

C. barbata, *Sw.,* **var. decora,** *Benth.,* Flora Austr. vii. 613. *C. decora,* Nees. A glabrous grass from 2 to 3 ft. high, leaves flat, with loose sheaths. Spikes dense, the awns longer than in the normal form, and only one terminal empty glume instead of the two of the typical form. Spikes 6 to 12, 1½ to 2 in. long. Outer glumes 1 to 1½ lines long, narrow, thin, and hyaline; the 2nd keeled and tapering into a fine point. Flowering glume not broad, membraneous, keeled, ciliate at the end with long hairs and slightly so at the margins, rather acute,

sometimes notched, the awn very fine, 3 to 4 lines long. Terminal empty glume very obtuse or truncate, slightly emarginate, the awn nearly as long as that of the flowering glume.

Hab.: Banks of the Burke, Boulia.

ASTREBLA, F. v. M.

I have for some years past hoped for the opportunity of placing on record an arrangement of the plants known under the name *Astrebla*. When these plants are seen in their native habitats the distinction is evident enough, but from dried specimens alone they are most perplexing. When recently out on the Diamantina and Georgina I took particular notice of them, and have come to the conclusion that they would be better recorded all as varieties of one species, so have placed them under the one which was first discovered—viz., *A. pectinata*, F. v. M. (the *Danthonia pectinata*, Lindl., in Mitch. Three Exped. ii. 26).

DIFFERENTIAL CHARACTERISTICS.

A. p. var. pectinata. Common Mitchell Grass. Spikelets woolly, closely imbricate, forming a broad spike 3 or 4 in. long, glossy when sterile or before the spikelets mature; the spikes bearing matured spikelets, very rough, and resembling a scrubbing-brush, smooth on the one side. Plants forming erect tussocks of 2 or 3 ft.

A. p. var. triticoides. Wheat-eared Mitchell Grass. Spikelets woolly, scarcely so closely imbricate as the last, or in some distant; forming the same solitary, broad flat spike 5 or 6 in. long, and bearing the rough woolly burrs all on the one side. Plant taller and coarser than the last, attaining the height of 4 or 5 ft.

A. p. var. curvifolia. Curly Mitchell Grass. Spikelets woolly, close or distantly arranged along one side of each spike. Spikes usually 2, narrow, often nodding, 8 or 9 in. long. Plant forming erect tufts 1 or 2 ft. high, the leaves narrow and much curved.

A. p. var. elymoides. Weeping Mitchell Grass. Spikelets long, narrow, nearly glabrous, singly or in parallel pairs appressed to the rhachis. Spike slender, solitary, often attaining more than 1 ft. in length. Plant decumbent, the stems several feet long.

The length of the awns or their direction is not constant enough to use for a character.

SPOROBOLUS, R. Br.

Under the name *S. virginicus*, Kunth. in the "Flora Australiensis" vii. 621, and other publications upon the flora, three distinct grasses are confused—two of these being only met with in or near brackish water, and one in or near fresh water.

S. virginicus proper is the stout-stemmed erect grass, with erecto-patent rather harsh leaves, found on the brackish marshy lands near the coast. Of this there is a smaller form.

S. virginicus, var. minor, *Bail.*, which is found in similar situations, but often further from the coast. Both have dark-green foliage and more or less elongated stems by which the plants spread.

The spike-like inflorescence is usually of a somewhat dark colour. Neither of these grasses will thrive far from brackish water, but in such localities they form excellent fattening pasture.

S. Benthami, *Bail.* (After Geo. Bentham, author of the "Flora Australiensis.") Stems wiry, erect or trailing; the erect stems sometimes bearing adventitious tufts at the nodes, which soon disarticulate and falling upon the damp land take root and thus produce fresh plants; the trailing stems often extend a considerable distance and produce plants in a similar manner to the common strawberry. The leaves of the erect stems are often quite filiform, but they are very thin and often 1 line broad on the trailing stems. The inflorescence is a very narrow, loose, spike-like panicle 2 to 4 in. long. Glumes narrow and nearly or quite transparent. The whole plant is pale-coloured.

Hab.: About the Diamantina and Georgina Rivers, where it is considered an excellent pasture grass.

Probably this and the *va . minor* of *S. virginicus* given above constitute in part the grass mentioned in Fl. Austr. vii. 621 as *var.? pallida*, a name that could not now be used for a species, there being one already so named.

NOTES ON TWO REMARKABLE GROWTHS OF FERNS BELONGING TO THE GENERA *ASPLENIUM* AND *POLYPODIUM.*

The remarkable fantastic forms which plants at times assume entirely defy one's power of adequately giving in words anything approaching a vivid description, and thus recourse must be had to figures. In no order of plants is this more evident than amongst those universal favourites, the ferns. Of those kinds which have been for many years in cultivation, one need not feel surprised at the production of the numerous sports met with. They are of far rarer occurrence in the wild state, and when such are formed from time to time in a state of nature are probably lost again, there being no cultivator handy to secure and perpetuate the form. In a few instances the Queensland fern-grower has met with these sports in the wild state and brought them under cultivation, and it must be acknowledged that the plants thus obtained have amply repaid all the care and trouble bestowed upon them. Those I now desire to draw attention to are—

1. A remarkable laciniated and forked-fronded sport of the Northern fern, *Asplenium simplicifrons.* The plant was found by an aboriginal and brought to Mr. Hobson, of Kuranda, who is now cultivating it in his bush-house. Mr. E. Cowley, of Kamerunga, from whom I received the specimens, says that the forked fronds (Plate I., Fig. 1) are seldom formed, but those with the laciniate margins (Plate I., Fig. 2) are very numerous. The normal form with entire margins (Plate I., Fig. 3) are also found on the plants. I have named the sport *Asplenium simplicifrons*, var. *laciniatum*, and hope that this unique form will not be long before it gets into the nurserymen's hands, and thus become one of the adornments of the bush-house.

2. The second of these growths is a sport from *Polypodium irioides*, which will be found described in my First Supplement to the Synopsis of the Queensland Flora, page 64, under the name of *Polypodium irioides*, var. *lobatum* (Plate II.). The native habitat

of this plant is said to be near Maryborough and Fraser Island. About twenty years ago I observed that fronds of this species growing along the margins of the Pioneer River frequently showed a tendency to form emarginate and at times even lobed ends to the usually quite entire fronds; but at that time I had no idea that such prominently lobed fronds as those on the Maryborough plants would ever be met with, for these so resembled fronds of *P. phymatodes* in general outline that, were it not for difference of sori and the presence of the normal form of fronds, I should have been inclined to have placed the specimens as belonging to this latter also widely-spread species. The surprise, however, of the first discovery of these deeply lobed fronds is now put completely in the shade by fronds which I have lately received from Mr. Gilbert Turner, of the Ridges, Mackay (Plate III., Fig. 1), the lobing of which vie with the fertile fronds of a *Platycerium* (Stag's-horn). Here, again, fronds of the normal form (Plate III., Fig. 2) are produced by the same plants. For the specimens of the Fraser Island form illustrated, I am indebted to Messrs. Pink and Cowan, Wellington Point. The illustrations will give a more perfect idea as to the forms assumed by the fronds; but, as the form of sori will not be so noticeable, I may mention that, while on the Fraser Island form the sori is rather more distant, larger, and oblong, those on the platycerium-like fronds from Mackay are numerous and small.

The following abnormal form of ferns of this character are probably peculiar to Queensland:—*Alsophila Rebeccæ*, var. *commutata; Doodia aspera*, var. *heterophylla; Asplenium simplicifrons*, var. *laciniatum; Asplenium attenuatum*, var. *Schneideri; Aspidium molle*, var. *Stradbroke Island; Polypodium confluens*, var. *lobatum; Polypodium rigidulum*, var. *Vidgeni; Polypodium rigidulum*, var. *cristatum; Polypodium irioides*, var. *lobatum; Platycerium grande.* A very curious growth of this fern may be seen in the bush-house at Bowen Park.

Order MUSCI.

GRIMMIA, Ehr.

G. pulvinata, *Hook. and Tayl.*, var. *obtusa; G. cygnicolla*, Tayl.
Hab.: Gladfield, *C. J. Gwyther.*

G. leiocarpa, *Tayl.*
Hab.: Gladfield, *C. J. Gwyther.*

GYMNOSTOMUM, Hedw.

Tufted, usually short, green, monœcious or diœcious mosses, of various habits, usually growing on rock or earth. Fruitstalk terminal, slender, rarely short. Capsule erect, rarely inclined; annulus obscure, persistent; teeth none. Operculum obliquely beaked. Calyptra cucullate.—Hook., in N. Z. Flora.

G. calcareum, *Nees and Hornsch.* Very minute; stems densely tufted, $\frac{1}{8}$-$\frac{1}{4}$ in. high, branched very slender. Leaves spreading, linear-lanceolate, rather obtuse, sometimes crisped when dry; margins flat. Fruitstalk very slender, $\frac{1}{8}$ in. long. Capsule oval-oblong; neck short; mouth red. Operculum conico-subulate, nearly as long as the capsule.—Hook., in N. Z. Flora.
Hab.: Gladfield, *C. J. Gwyther.*

TORTULA, Hedw.

T. (Desmatodon) nervosa, *Bridel.* Stem ¼ in. high. Leaves yellow-green, spreading, ovate-oblong, apiculate, concave, margin reflexed, nerve thickened upwards, excurrent. Fruitstalk 1 to 3 lines long. Capsule ovoid, erect, teeth sometimes absent; lid hardly beaked.

Hab.: Gladfield, *C. J. Gwyther.*

TORTELLA.

T. perhumilis, *Broth.* (n. sp.)

Hab.: Gladfield, *C. J. Gwyther.*

MACROMITRIUM, Brid.

M. (Goniostoma) Whiteleggei, *Broth.*

Hab.: Bellenden-Ker and Bartle Frere Mountains, *Stephen Johnson.* (V. F. Brotherus.)

FUNARIA, Schreber.

F. calvescens, *Schw.* (placed by some authors as a variety of *F. hygrometrica*, Hedw. Pedicel straight; capsule narrow and nearly erect; leaves spreading, rather longer and narrowed, twisted when dry.

Hab.: From a railway cutting, Eumundi, *Field Nat. Excursion.*

BRYUM, Linn.

B. argenteum, var.

Hab.: Gladfield, *C. J. Gwyther.*

METEORIUM, Brid.

M. (Papillaria) intricata, *Mitt.*

Hab.: Eumundi, on twigs, *Field Nat. Excursion.*

RHYNCHOSTEGIUM, Schimper.

R. tenuifolium, *Hedw.* = *Hypnum collatum*, J. Hook. and Wils. Stems matted, small, slender, arching, prostrate, and ascending, pinnately-branched, 1-2 in. long; branches compressed, long or short. Leaves dark-green, subsecund, ovate-cordate, acuminate, serrulate, concave; nerve produced beyond the middle; cells linear; perichætial recurved, long-acuminate. Fruitstalk ½ to 1½ in. high, smooth. Capsule cernuous, ovoid-oblong, curved; operculum with a long slender beak. Inflorescence monœcious.—Hook., N. Z. Flora.

Hab.: Gladfield, *C. J. Gwyther.*

RHAPHIDOSTEGIUM.

R. acicula, *C. Muell.*

Hab.: Bundaberg, *J. Keys*; Gladfield, *C. J. Gwyther.*

R. austro-circinale, *Broth.* (n. sp.)

Hab.: Bundaberg, *J. Keys.*

R. exalare, *C. Muell.*

Hab.: Bundaberg, *J. Keys.*

LESKEA.

L. calochlora, *C. Muell.*

Hab.: Gladfield, *C. J. Gwyther.*

GIGASPERMUM.

G. repens, *Lindl.*

Hab.: Gladfield, *C. J. Gwyther.*

Order HEPATICÆ.

FRULLANIA, Raddi.

F. squarrosula, *Hook. and Tayl.* Stem 1 in. long, 2-pinnate. Leaves olive-green or almost black, patent and recurved, squarrose, ovate, rounded at the apex; dorsal margin often white; ventral sinuate in the middle; lobule small, on the incurved margin of the leaf kidney-shaped or hooded, brown; involucral with an ovate acute lobule. Stipules orbicular ovate, 2-fid. Perianth oblong-ovate, obtuse, smooth at the back, convex and obscurely 2-keeled above; ventral face with one keel.—Hook., in N. Z. Flora.

Hab.: Eumundi, *Field Nat. Excursion.*

SYMPHYOGYNA.

S. flabellata, *Mont. (Hymenophyton).* Stem 1 to 3 in. high. Frond orbicular or reniform, 3 to 5-partite in a fan-shaped manner, ½ to 1 in. broad; segments linear, 2-fid, nerved, obtuse. Fruit in the forks; involucral scales 2-lobes.—Hook., in N. Z. Flora.

Hab.: Near Brisbane and Nerang Creek, *H. Schneider.*

Order LICHENES.

These lichens, which are reported for the first time from Queensland, were, with few exceptions, determined by Dr. Jean Müller, of Geneva; they are from the collections of Messrs. Bailey, Gwyther, Hartmann, Knight, and Shirley. The descriptions are supplied from various sources by Mr. John Shirley, B.Sc., District Inspector of Schools, Queensland.

Tribe LECANOREÆ.

Mull. Arg. in Bot. of Socot. p. 359.

LECANORA.

Mull. Arg. Lich. Gen. p. 42.

L. atra, *Ach.*, **v. serialis,** *Mull. Arg.* Thalline granules distinctly or indistinctly disposed in radiating or subreticulately joined series.

Hab.: On rocks, Thursday Island, *Knight*, No. 268.

L. subfusca, *Ach.*, **v. conjungens,** *Mull. Arg.* Thallus somewhat thin, firm, very closely rimulose, otherwise smooth, with a black border; apothecia finally large, margin at length undulate; disk when dry black, lamina greenish above.

Hab.: On rocks, Thursday Island, with *v. gangalea.*

L. albellaria, *Mull. Arg.* Thallus white, granular; hypothallus forming a white halo, grains crowded or scattered, obtusely angular, convex, surface firm; gonidia globose, diameter 8-10 μ; apothecia ½-⅗ mm. wide or less, sessile, densely spread; margin concolorous and entire, smooth or at length obsoletely rugulose, always prominent,

obtuse; disk at least slightly concave, albido-pallid, or finally fulvescent-fleshy, nude; epithecium hyaline-fulvescent, otherwise hyaline; spores 8, 13 x 7½ μ, oblong-ellipsoid.

Hab.: On bark, *Knight*, No. 324.

L. melacarpella, *Mull. Arg.* Thallus obscurely cinereous, thin, continuous, very delicately areolate-rimulose, margin effuse; apothecia ½-¾ mm. wide, sessile, regular; margin concolorous, thin, tuberculose-asperulate, subcrenate, scarcely rising above the disk; disk, either moist or dry, is black and nude, from flat becoming finally convex; epithecium olive-brown, lamina elsewhere hyaline; spores 8, 10-12 x 6-7 μ, ellipsoid.

Hab.: On rocks, Thursday Island, *Knight*, No. 279.

L. Knightiana, *Mull. Arg.* Thallus ochroleuco-albid, moderate, limitate; thallus continuous or minutely and crowdedly rimulose, surface plane; apothecia 1·5 mm. wide or less, appressed-sessile; margin scarcely rising above the disk, gibberose-unequal, within slightly undulate and smooth; disk fulvo-rufous and nude; epithecium fulvo-fuscidulous or subhyaline, elsewhere hyaline; spores 8, 8-15 x 6-8 μ, ellipsoid, commonly with thick border.

Hab.: On rocks, Thursday Island, *Knight*, Nos. 213, 234, 258, 271; *Bailey*, No. 198.

L. flavido-fusca, *Mull. Arg.* Thallus flavid, thin, and continuous, at first smooth, then crowdedly rugulose, or finally granose-rugulose, bordered by a black line; apothecia ½-¾ mm., sessile, plane; margin flavid, entire, thickish, prominent; disk plane, fulvescent-fuscous, nude; epithecium, flavid-fulvescent, lamina hyaline; spores 8, 10-13 x 7-9 μ, subglobose or elliptical.

Hab.: On the bark of small branches, Toowoomba, *Hartmann*.

RINODINA, Korb.

Syst. p. 122.

R. diffractella, *Mull. Arg.* Thallus cinerascent-fuscous, minutely areolate-diffract; areolæ, ¼-⅓ mm. wide, 4-5-sided, flat and thin, shining; apothecia at first innate and the areolæ spuriously marginate, finally surrounded by a subregular or subentire thalline border; disk plane, orbicular or subangular, black and nude; epithecium black-brown; hypothallus hyaline; spores 8, 7-10 x 4-4½ mm., 2-locular.

Hab.: On rocks, Mount Gravatt, *Shirley*, No. 1908.

PERTUSARIA, DC.

Fl. Fr. 2, p. 319.

P. (s. Lecanorastrum) rhodotropa, *Mull. Arg.* Thallus white with rose-purple prominences, moderate, rugulose, elsewhere surface smooth, margin determinate, soft; verrucæ 1 mm., numerous, sparingly crowded, elate and tumid, hemispherical, margin regular or subundulate-unequal, or in part obtusely verrucose, vertex ulcerate-truncate, about the disk acutely marginate, 1-2 fruited; disk finally nude and rufo-carneous; spores solitary, 125 x 38 μ, elongate-ellipsoid, within smooth.

Hab.: On bark, *Knight*, Nos. 30, 32, 307, 308, 309.

P. (s. Pertusæ) plicatula, *Mull. Arg.* Thallus straw-yellow, thin, continuous and smooth, shining, usually rimose and plicate-rugose; verrucæ 1 mm., hemispherical, base constricted, apex truncate, centre irregularly undulate or plicate-depressed, with many ostiola; ostiola small, ·03-·08 mm., neither impressed nor emergent, blackish; spores 2, elongate-linear, 110 x 35 μ, within smooth.

Hab.: On bark, *Knight*, No. 41.

P. (s. Pertusæ) elliptica, *Mull. Arg.* Thallus white, very thin, smooth; verrucæ separate, ellipsoid-hemispherical, 1·3 x ·8 mm., regular and smooth, base not constricted, obtuse, not at all truncate above, in the centre pierced by 2-5 subconfluent ostiola; ostiola blackened, small or in part large and confluent, not emergent; spores 4, 85 x 32 μ, strongly plicate-costulate.

Hab.: On dead wood, Goodna, *Shirley*, No. 1754, pro p.

P. (s. Pustulatæ) leucostoma, *Mull. Arg.* Thallus argillaceo-albid, thin, from continuous to rimose or finally subparallel-rugulose; verrucæ 1 mm., distinct or geminate, sessile, in small pyramids, base circumscribed, shortly conico-attenuate, regular, apex not at all truncate, at first furnished with 1-3 approximate or confluent ostiola, afterwards represented by a white, pulverulent, convex disk, $\frac{1}{5}$ mm. wide; spores 4-8, uniserial, 70 x 25 μ, within finely plicate-costulate.

Hab.: On bark, Toowoomba, *Hartmann.*

P. (s. Depressæ) leiocarpella, *Mull. Arg.* Thallus fuscescent-cinereous, very thin, rimulose, or at length rugulose-granular, the surface itself fairly smooth; verrucæ $\frac{1}{2}$ to $\frac{3}{5}$ mm., sessile, depressed-hemispherical, margin regular and obtusely gibbose, base slightly constricted, vertex broadly truncate, centre broadly but slightly depresso-concave, the depression broadly and obtusely marginate, the whole concolorous with the thallus, and levigate, 3-5 fruited; ostiola commonly confluent; spores 4-6, 70 x 32 μ, within smooth.

Hab.: On bark, *Knight*, No. 11.

P. (s. Depressæ) subrigida, *Mull. Arg.* Thallus straw-yellow, undulate unequal, surface smooth; verrucæ 1-1·8 mm., turgid, base slightly constricted, outline fairly regular, levigate, vertex narrowly impresso-concave; ostiola pallid, crowded in the centre of the cavity; spores 5-8, 90 x 37 μ, within smooth.

Hab.: On bark, Brisbane, Toowoomba, *Shirley*, No. 1870.

P. (s. Leioplacæ) leucoxantha, *Mull. Arg.* Thallus albid-flavicant, moderate, continuous, at length slightly rimulose, surface smooth; verrucæ 1 mm., hemispherical, base limitate, apex not depressed, smooth or obsoletely gibberose, concolorous; ostiola 1-4, black, approximate, neither prominent nor impressed; spores in one series, 8, 60 x 27 μ, within smooth.

Hab.: On rocks, Thursday Island, *Knight*, No. 280.

P. (s. Leioplacæ) amblyogona, *Mull. Arg.* Thallus straw-yellow rimose-areolate, ulcerate, superfices everywhere smooth; verrucæ 2 mm., depresso-hemispherical, convex, base constricted, outline irregularly 6-8 angular, not verrucose, ulcerate-punctate, and rather whiter than the thallus; ostiola sulphur-coloured, not emergent; spores 1-2 seriate, 8, 70 x 32 μ, within smooth.

Hab.: On bark, Toowoomba, *Hartmann.*

P. (s. Irregulares) irregularis, *Mull. Arg.* Thallus white or yellowish white, moderate; verrucæ irregular, turgid, variously connate, nigro-ostiolate; ostiola neither depressed nor emergent; spores 2, rarely 1, elongate and smooth, 100-125 x 30 μ.

Hab.: On bark, Thursday Island, *Knight*, No. 31, pro p. and 41 pro p.

P. (s. Seriales) straminea, *Mull. Arg.* Thallus and verrucæ pale-yellow or straw-coloured, the surface polished, thin, rugulose; verrucæ 1 mm., globose-hemispherical, base constricted, vertex rotundate or slightly truncate, not depresso-concave, minutely nigro-ostiolate, discrete or as if irregularly connate; ostiola few and crowded, at length bordered by a smoky halo; spores 2, 110 x 30 μ, not costulate.

Hab.: On bark, Thursday Island, *Hartmann*.

P. (s. Seriales) confluens, *Mull. Arg.* Thullas flavid, thin, rimose and undulate in transverse subparallel ridges, the surface smooth; verrucæ to 1 mm., in part oblong-orbicular, often confluently 2-4 times longer than wide and subparallel, base slighly constricted, outline and surface obtusely gibbose-angular, rigid, concolorous, minutely and sparingly sulphureo-ostiolate; ostiola very minute, rather prominently umbonate; spores in one series, 8, 45-65 x 20-26 μ, within smooth.

Hab.: On bark, Toowoomba, *Knight and Hartmann*.

P. (s. Seriales) albinea, *Mull. Arg.* Thallus white, very thin, obsoletely rugulose, at length evanescent; verrucæ concolorous, white opaque, $\frac{1}{2}$-$\frac{4}{5}$ mm., rarely solitary and then hemispherical, fairly regular and with the base slightly constricted, and apex not at all truncate; commonly, however, confluent in longitudinal series, sparingly nigro-ostiolate; ostiola acute and rather prominent, ·15-·18 mm.; spores 2, 170 x 35 μ, within smooth.

Hab.: On dry wood, Goodna, *Shirley*, No. 1754 pro p.

P. (s. Graphica) macra, *Mull. Arg.* Thallus plumbeo-cinereous, moderate, thinly areolate-rimose; areolæ irregular, flat, and smooth; verrucæ $\frac{1}{2}$ mm., single or geminately confluent, nano-hemispherical, outline orbicular or subtriangular, passing gradually into the thallus; vertex depressed and ostiola confluent, as if terminating in an angular or oblong depressed disk; margin pallid, angulose, and subacute; spores 1-2 seriate, 8, 32-36 x 17-20 μ, within smooth.

Hab.: On rocks, Thursday Island, *Knight*, No. 262.

Tribe LECIDEEÆ.

Mull. Arg. Lich. Gen. p. 50.

LECIDEA.

Mull. Arg. in Bot. Socot. p. 367.

L. (s. Biatora) aspidula, *Krph.*, **v. dispersa,** *Mull. Arg.* Thallus dealbate and disperso-areolate.

Hab.: On rocks, Thursday Island, *Knight*, No. 283.

L. (s. Biatora) insulana, *Mull. Arg.* Thallus yellowish-white or ashy-white, tartareous, thickish, usually areolate, diffracto-rimose; areolæ with flat surface, subcontiguous, outline undulate flexuose, within white; apothecia to 1 mm., from innate to slightly

emergent, flat, finely marginate or immarginate, when young lurid-fuscous, usually blackish, nude, not pale when moist but slightly greenish-black; lamina above leek-green, elsewhere hyaline; spores 8, ellipsoid, 10-12 x 5-6 μ.

Hab.: On rocks, Thursday Island, *Knight*, No. 284, 286, pro p.

L. (s. Lecidella) nesophila, *Mull. Arg.* Thallus white, thin, rimose-interrupted, flattish or as if slightly granose-unequal; apothecia to ·5 mm., sessile, when young flat and thinly margined, usually immarginate and strongly convex, wholly opaque and deep black, when moist slightly fusco-pallid; epithecium olive-black; hypothecium and lamina hyaline; paraphyses free, apex clavate-capitate; spores 2-seriate, 8, 7-11 x 6-7 μ.

Hab.: On maritime rocks, Thursday Island, *Hartmann and Knight.*

L. (s. Eulecidea) ferax, *Mull. Arg.*, **v. geographica.** Thallus lead-coloured, finally white, crowdedly rimulose, and irregularly reticulately bordered with a black hypothalline line; apothecia very numerous and crowded, or here and there scattered, often angular by mutual pressure, $\frac{2}{3}$ mm., appressed sessile, opaque, black, persistently concave, bordered by a prominent thickish margin; disk slightly concave, nigro-cæsius; epithecium and hypothecium nigro-fuscous; spores 8, ellipsoid, 10-11 x 6 μ.

Hab.: On rocks, Thursday Island, *Knight*, No. 237.

BLASTENIA.

Mass. Syst. Lich. Blast. p. 13.

B. ochroleuca, *Mull. Arg.* Thallus ochroleuco-albid, thin, continuous, here and there delicately rimulose; hypothallus black; apothecia ·3 mm., sessile, thickish, concave; excipulum outwardly nigro-fuscous and nude; margin entire and prominent; disk plane, when moist rusty-green pruinose; epithecium yellowish, lamina hyaline; spores 2-seriate, 8, oblong ellipsoid, 11-15 x 5 μ, dissepiments greatly thickened.

Hab.: On rocks, Thursday Island, *Knight*, No. 339.

BUELLIA.

Mass. Ric. p. 80; Mull. Arg. Lich. Gen. p. 63.

B. amblygona, *Mull. Arg.* Thallus whitish diffracto-areolate; hypothallus showing black between the areolæ, thick; areolæ obtusely angular, irregular, slightly convex, at the margin obtuse, often fissured or diffracto-divided, adorned with 2-5 black spots; apothecia small, 1 mm., wide, sessile, flat, and thinly margined, black and nude; epithecium and hypothecium brown, spores 2-seriate, 8, 12 x 6 μ, 2-locular.

Hab.: On rocks, Thursday Island, *Knight.*

B. macrosporoides, *Mull. Arg.* Thallus white-pallid, moderate, thinly diffracto-verrucose; verrucæ when young flat and subcontiguous, irregular, then large and turgid, much smaller than the apothecia; apothecia to 1 mm., sessile, flat, and thinly margined, then convex and immarginate, opaque, black, or the back of the excipulum nigro-fuscous; epithecium and hypothecium olive-brown; spores 4 or 5, 24-28 x 13-16 μ.

Hab.: On earth, Thursday Island, *Knight*, Nos. 206, 210.

Tribe THELOTREMEÆ.

Mull. Arg. Graph. Fee. p. 3 and 5.

OCELLULARIA.

Mull. Arg. L.B. No. 363.

O. jugalis, *Mull. Arg.* Thallus glauco-albid, thin, rimulose and smooth; apothecia either in thalline prominences, or longitudinally seriate, to ·8 mm. wide, rather straight, slightly prominent, surface plane; margin obtuse and wide, within separated; base at length pale; ostiola black or nigro-fuscous; central columella wanting; spores 4-8, 30-35 x 5-6 μ, narrow fusiform, at both ends acute, 9-10 locular.

Hab.: On bark, Sankey's Scrub, *Shirley*, No. 1836.

O. platychlamys, *Mull. Arg.* Thallus yellowish-white, very thin, smooth, mealy, usually interrupted and in isolated patches, at length evanescent; apothecia ·6 m.m., hemispherical, regular, opening by a narrow pore, the ostiolum not impressed; perithecium hyaline, columella none; spores 4-8, 100 x 20 μ, 18-23-locular, loculi narrow, thick.

Hab.: On branches, Eumundi, *Bailey*.

O. annulosa, *Mull. Arg.* Thallus bluish-white, thin, unequal, broken, surface obsoletely rugulose, shining; apothecia ·4 mm., hemispherical emersed, regular, usually wide open; margin acute, at length 4-6 fissured; base snowy; perithecium above nigro-fuscous, elsewhere indistinct; spores, 2, 95 x 9 μ, slender, 20-26 locular.

Hab.: On bark, Mount Gravatt, *Shirley*, No. 1894.

THELOTREMA.

Mull. Arg. Grap. Fée, p. 4.

T. cyphelloides, *Mull. Arg.* Thallus white glaucous, thin, closely rimulose, surface powdery; apothecia equally scattered, to ·3 mm., attaining the surface of the thallus or slightly emergent, white or snowy, *circumsciss*, simulating cyphellæ or pseudo-cyphellæ; margin radiately fissured, ostiolum depressed, broad, clothed with a snowy stratum; interior wholly hyaline; spores 8, 25 x 7-8 μ, 9-10-locular, loculi 2-3 locellate.

Hab.: On bark, Darling Downs, *Bailey*, No. 700.

T. microphthalmum, *Mull. Arg.* Thallus clay-white, very thin, continuous and smooth, rather shining; apothecia equally dispersed; ostiola black, ·06-·1 mm. wide, slightly depressed, orbicular or here and there elliptical, within very narrow, decolorate-albid, slightly depressed and obtuse; perithecium fulvescent; no columella; spores 8, 13-17 x 5-8 μ, 2-5, usually 4-locular, loculi broad, 2-locellate.

Hab.: On bark, Brisbane scrubs, *Bailey*, No. 773.
Syn.: *Ocellularia terebratulum*, Shirley.

T. profundum, *Shirley.* Lich. Fl. Qld. p. 131, has priority over *T. profundum*, Mull. Arg., Sertum Austral. p. 3 (315). Syn.: *Ascidium profundum*, Stirton, Addit. Lich. Fl. Qld. p. 5.

LEPTOTREMA.

Mont. and van der Bosch in Mont. Syll., p. 365 (1855); et Lich. Jav. 2, p. 57.

L. patulum, *Mull. Arg.* Thallus white or whitish or cæsious, very thin, opaque, determinate; apothecia gaping, denudate, cæsiopuinose, innate, to ·5 mm., proper margin sparingly elevated; spores 1-4, often 2, brown, oblong, parenchymatous, 58-130 x 20-27 μ.

Hab.: On bark, Darling Downs, *Bailey*, No. 722.

L. polycarpum, *Mull. Arg.* Thallus moderate, from glaucous to yellowish-white, smooth, crowdedly fertile; apothecia to $\frac{3}{4}$ mm., orbicular, from immersed to moderately emergent; thalline margin thick, obtuse, entire, above depressed and decolorate-albescent, often circumsciss, base nigrescent; spores brown, in narrow asci, 1-seriate, 8, 10-13 x 5-8 μ, 4-locular, loculi 1-3, bilocellate.

Hab.: On bark, *Knight*, No. 80.

L. nitidulum, *Mull. Arg.* Thallus thin, whitish, smooth, and minutely rugulose; apothecia densely spread, and here and there confluent, from innate to moderately emergent, nano-hemispherical, shining like the thallus, apex opening with a minute orbicular or oblong or subirregular pore, $\frac{1}{2}$ mm. wide; apex not depressed, regular, blackish; true margin above black; thalamium produced into the base of the thick black columella; spores brown, 15-22 x 8-12 μ, ellipsoid, 4-locular, central loculi bilocellate.

Hab.: On bark, *Knight*, No. 22.

L. æmulum, *Mull. Arg.* Thallus white, thin, and continuous, powdery, smooth or obsoletely rugulose; apothecia to 1 mm., nanohemispherical, or less emergent and obtusely marginate; ostiola to ·3 mm.; perithecium within the apex brown, elsewhere hyaline; no columella; epithecium clothed with a white stratum; spores 4, rarely 5-6, 40-60 x 10-13 μ, 14-16-locular, central loculi 2-3 locellate, the others simple.

Hab.: On bark, *Knight*, No. 217.

Tribe GRAPHIDEÆ.

Mull. Arg. Graph. Fée, p. 13; and Bot. Socot. p. 372.

PLATYGRAPHA.

Nyl. Ess. p. 188; Mull. Arg. Graph. Fée, p. 13.

P. Shirleyana, *Mull. Arg.* Thallus yellowish-white, thin, continuous, and smooth; gonidia ellipsoid, articulate; apothecia lirellate to $1\frac{1}{2}$ mm. long, ·3-·35 mm. wide, simple or bifurcate, variously curved, at length emergent, thickly thalline clothed, smooth; lips closely connivent, interior margin at length narrowly disclosed, finally gaping slightly, and exhibiting a narrow cinereo-pruinose disk; perithecium lateral, black, wanting beneath the hypothecium, which is obfuscate; paraphyses intimately connected; asci 8-spored; spores 28-33 x $4\frac{1}{2}$-5 μ, broadly digitiform, 6-8-locular.

Hab.: On bark, Sankey's Scrub, *Shirley*, No. 1849.

MELASPILEA.

Nyl. Prod. p. 170 et Scand. p. 263; *Melanographa*; Mull. Arg. L.B. No. 535; and Graph. Fée, p. 4.

M. (s. Eumelaspilea) congregantula, *Mull. Arg.* Thallus whitish, like a faint halo, subrugulose, shining, usually evanescent; apothecia to ·8 mm. long, ·012-·017 mm. wide; simple or 2-3 furcate, sessile, wholly black, here and there densely congregated; margins from almost shut to broadly gaping, subundulate, nude like the disk; perithecium wanting at the base; spores 8, 8-11 x 4-5 μ, oblong-ovoid, 2-locular, from hyaline at length moderately brown. It resembles a minute form of *M. congregans*, but apothecia and spores are smaller.

Hab.: On bark, *Knight*, No 102, pro p.

M. (s. Melaspileopsis) stellaris, *Mull. Arg.* Thallus white, forming a very thin halo, smooth and shining, usually evanescent; apothecia stellate-ramose or almost simple, black and opaque, to 1·3 mm. wide, branches ·15-·2 mm. wide; lips fine, at length wide apart; perithecium everywhere thick and complete, black; paraphyses connected; spores 8, brownish, 10-12 x 5½ μ, obovoid, 2-locular.

Hab.: On bark, *Knight*, Nos. 102, 293, 296, 312, 338.

OPEGRAPHA.

Nyl. Ess. p. 188; Ach. Univ. p. 43, pro. p.

O. lacteella, *Mull. Arg.* Thallus milk-white, very thin, continuous and smooth, at length evanescent in spots; lirellæ appressed sessile; ·1-·13 mm. wide, in length at times 4 times greater, black and opaque, semi-cylindrical; lips closely connivent; perithecium black-brown; at the base complete; epithecium black-brown; spores 8, 12-14 x 3½-4 μ, at both ends obtuse, 4-locular.

Hab.: On bark, Cairns, *Shirley*, No. 1822.

O. prosodea, *Ach.* Thallus a sordid pale-brown, cartilagineous membranaceous; apothecia sessile, thick, subcylindrical, shining, straight; the margin connivent, elevate; disk closed, subcarinate; spores 15-septate, 65 x 8 μ.

Hab.: On bark, Cairns, *Shirley*.

O. minutula, *Mull. Arg.* Thallus bluish-white, very thin, smooth and at first continuous, then rimose; lirellæ black, closely appressed, ·12 mm. wide, occasionally 2-3 times longer, obtuse and nude, simple; lips turgid, entire, fairly connivent; perithecium complete at the base; spores in elongate-obovoid asci, 8, 13-15 x 4-5 μ, at both ends obtuse, equally 4-locular. Differs from *O. lacteella*, Mull. Arg., in the thallus, the apothecia slightly innate-impressed, and the form of the spores.

Hab.: On bark, Darling Downs, *Bailey*, No. 721.

O. (s. Lecanactis) microcarpella, *Mull. Arg.* Thallus a clear white, except where coloured by the cæsious pruina of the numerous apothecia, thin, obsoletely rugulose, pulverulent; apothecia crowded, to ·25 mm. broad, orbicular, at first cæsious from the powdery clothing, then nude, opaque, black, when young immersed, usually elato-convex, hemispherical, then flatter, and the outline somewhat obtusely angular

or rarely elongate; perithecium complete, everywhere black; spores in cylindrical asci, 8, 20-24 x $3\frac{1}{2}$-$4\frac{1}{2}$ μ, slenderly digitiform, at both ends obtuse, faintly halonate, 6-7-locular.

Hab.: On bark, Goodna, *Shirley*, No. 1757.

GRAPHIS.

Mull. Arg. L.B. No. 454; and Bot. Socot. p. 377.

G. (s. Aulacogramma) descissa, *Mull. Arg.* Thallus whitish ashy or fulvescent whitish, very thick, strongly plicate-rugose, the surface itself smooth; lirellæ 2-4 mm. long, simple or irregularly branched, variously curved, subintricate, immersed, then moderately prominent, clothed with a stratum of the thallus, 1 mm. wide, the vertex at length nudate, black, and on both sides longitudinally sulcate-desciss; perithecium thick at the base, ·25 mm. wide, lips clauso-connivent, back 1-sulcate or entire; spores 8, obtusely fusiform, 8-locular, 35 x 8 μ.

Hab.: On bark, *Knight*, No. 339.

G. (s. Aulacogramma) rimulosa, v. brachycarpa, *Mull. Arg.* Thallus sordid white, fissured, but not divided into areolæ; apothecia to 1 mm., from almost orbicular to ovate, seldom branched, one end usually obtuse, emergent, dull black, nude; lips tumid, connivent, or slightly gaping.

Hab.: Cairns, *Shirley*, No. 1821.

G. (s. Aulacographa) vinosa, *Mull. Arg.* Thallus whitish, very thin, continuous and smooth; lirellæ to ·25 mm., 2-4 times longer, variously curved, bi-tri-furcate and simple, slightly emergent, the back thalline clothed, the extremities acute; lips connivent, here and there sulcate and entire; perithecium black, deficient beneath; lamina wine-red or pallid carmine or cupreo-violaceous in its lower part; asci 2-4-6 spored; spores 38-45 x 8-10 μ, obtusely fusiform, 8-10 locular.

Hab.: On bark, Thursday Island, *Knight*, Nos. 10, pro p., 146, 149 pr. p. 287 pro p., 329 pr. p., 337, 341.

G. (s. Eugraphis) immersella, *Mull. Arg.* Thallus whitish, very thin, finally rimose; lirellæ linear, thin, resembling those of *G. tenella*, but longer, immersed, not rising above the surface of the thallus, variously curved, simple and branched, acuminate; lips connivent, apex black, usually forming a black line, not at all sulcate; perithecium black, base wanting; lamina hyaline; spores 8, 40-45 x 9 μ, 12, locular.

Hab.: On bark, Cairns, *Shirley*, Nos. 1793, 1818.

G. (s. Eugraphis) albissima, *Mull. Arg.* Thallus chalky-white, thin, powdery, finally interruptedly evanescent; lirellæ 3-5 mm. long, at first subimmersed and white powdery, then emersed and duplicated with a thick thalline stratum, to ·8 mm. wide, variously curved; lips connivent, narrow, nude, conjoined, forming a black line, not sulcate, rather acute; perithecium black, wanting beneath; lamina hyaline; spores 3-4, rarely 6, fusiform, 30-38 x 7 μ, 10-locular. Approaches *G. Sayeri*, but the colour of the thallus and the slender incrassate-corticate lirellæ separate.

Hab.: On bark, *Knight*, No. 147.

G. (s. Anomothecium) epimelæna, *Mull. Arg.* Thallus white, very thin, continuously effuse and smoothish; apothecia 1-2 mm. long, ·2-·3 mm. wide, simple or 2-3 furcate, innate and thalline clothed, then slightly emergent, and on both sides desciss from the thallus, rather deplanate, not at all sulcate; margins when dry closely connivent, thalline clothed, but the apical line nude and black, when moist gaping, and showing a fusco-pallid obtusely sulciform disk; perithecium fusco-nigrous at the apex, but elsewhere hyaline; spores 8, 40-60 x 10-12 μ, 10-12, locular.

Hab.: On bark, Brisbane scrubs, *Bailey*, No. 778.

Syn.: *G. malacodes*, Stirton non Nyl., Shirley, Lich. Fl. Qd. p. 143.

G. (s. Mesographis) xanthospora, *Mull. Arg.* Thallus bluish-white, thin, continuous, superficially smooth or slightly farinulent; lirellæ 2-4 mm. long, ·25 mm. wide, from innate usually emergent, simple or bi-tri-furcate, strongly curved, furnished with a thick, obtuse, somewhat depressed thalline margin, not wholly clothing the apex of the perithecium; lips closely connivent, lightly sulcate, apex black or cæsious; perithecium blackish above; spores 8, flavid, 32-40 x 8-9 μ, 8-10-locular. In characters of perithecium approaches *G. endoxantha, Nyl.*

Hab.: On bark, Trinity Bay, *Sayer*.

PHÆOGRAPHIS.

Mull. Arg. L.B. No. 454, and Graph. Fée., p. 23.

P. (Cœlogramma) pseudomelana, *Mull. Arg.* Thallus fulvescent-olivaceous, cartilagineous, gibberose-rugose, elsewhere smooth and entire; lirellæ slightly emergent, 2-4½ mm. long, simple or divaricately 2-4 furcate, branches ·3 mm. wide, acuminate, variously curved, outwardly thalline-corticate; lips usually gaping widely, the marginal apex terminating in a black line; disk concave, when dry black, when moist pallescent and aquose-subpellucid; perithecium black, laterally thick above and thin below; spores 8, brownish, 18-20 x 6½-8 μ, cylindrical-ellipsoid, 6-locular.

Hab.: On bark, Saukey's Scrub, *Shirley*, No. 1838.

GRAPHINA.

Mull. Arg. L.B. No. 143, 476; and Graph. Fée, p. 38.

G. (s. Aulacographina) sophistica, v. recta, *Mull. Arg* Lirellæ 1-2½ mm. long, ·5-·6 mm. wide, straight or straightish, not at all parallel, at both ends obtuse, strongly thalline clothed, scarcely at all sulcate. Outwardly resembles *G. lineola*, Ach.

Hab.: On bark, Thursday Island, *Knight*, Nos. 149, 236, 294.

PHÆOGRAPHINA.

Mull. Arg. L.B. No. 476, and Grap. Fée, p. 47.

P. (s. Eleutheroloma) caesio-pruinosa v. monospora, *Mull. Arg.* Lirellæ fully prominent, orbicular-oblong, commonly ·5-1·5 mm. long, and for this species abbreviated, simple or bifurcate, at both ends obtuse, or one end acuminate; spores solitary, 100-180 μ long.

Hab.: On bark, Toowoomba, *Hartmann*.

HELMINTHOCARPON, Fée.

Mull. Arg. L.B. Nos. 1192-4.

H. Baileyanum, *Mull. Arg.* Thallus glaucescent-whitish, thin, continuous, the surface very smoothly sub-granular; apothecia to 1·7 mm. long, orbicular or oblong, obtusely angulose or sublobate, straight or reniform-incurved, girdled with an obtuse, slightly prominent thalline margin, the whole moderately emergent, when young concolorous with the thallus; disk plane, white pruinose, bordered by a black zeorine line, at length nudate, and cæsio-nigricant; perithecium black, lateral, wanting beneath the lamina; spore 1, 120 x 45 μ, parenchymatous.

Hab.: On bark, Toowoomba, *Shirley*, No. 1819.

ARTHONIA.

Ach. Univ. p. 25; Th. M. Fries Heterol. p. 96; Almquist Monog. Arthon. p. 8.

A. gracilior, *Mull. Arg.* Thallus whitish, very thin, evanescent; apothecia when dry black, when moist blackish, nude, to 1 mm. long, ·15-·2 mm. wide, astroid 3-4-ramose, or astroid-angulose and simple; branches straight, rather acute, and subplane; spores 8, 12-13 x 4½ μ, slender, 4-5-locular, the upper loculus largest.

Hab.: On bark, *Knight*, No. 305.

A. amœna, *Mull. Arg.* Thallus whitish, very thin and continuous, wholly smooth and shining; apothecia rose-carmine, somewhat thalline-subvelate, orbicular and oblong, to ·25 mm., subastroid or in various ways aggregated as in *A. gregaria*, rather pruinose; asci globose-obovoid; spores 8, hyaline, 24 x 6-8 μ, fusiform, 4-locular, loculi shorter and narrower at both ends.

Hab.: On bark, Sankey's Scrub, *Shirley*, No. 1854.

A. rubella (*Fée*), *Nyl.* Thallus inconspicuous; apothecia reddish-brown and blackening, innate, slender, flexuous and branching. Spores oblong-ovoid, 4-6-locular, the upper and often the lower cell larger, brown or decolorate, 25-43 x 10-15 μ. Reaction of the hymenium blue, of thecæ vinous red. Spermatia straight, 6 μ long.

Hab.: On bark, Cairns, *Shirley*, No. 1817.

ARTHOTHELIUM.

Massal. Ric. p. 54; Th. Fries Heterol. p. 97; Stitz. Flecht. p. 152; Mull. Arg. Graph. Fée, p. 60.

A. microsporum, *Mull. Arg.* Thallus glauco-albid thin, rugulose unequal, at length subrimose; apothecia to ·7 mm., black when dry or moist, nude, orbicular, and shortly and divergently ramose-angulose, subconcave, obsoletely depressed, with obtuse angles; asci obovoid, subincurved, 8-spored; spores hyaline, 12-13 x 4-5 μ, 5-6-locular, central loculi, longitudinally 1-2-septate.

Hab.: On bark, Toowoomba, *Hartmann*.

A. polycarpum, *Mull. Arg.* Thallus white-glaucous, thin, superficially leprose, subrugose-unequal; gonidia chroolepoid; apothecia numerous, nigro-fuscous, when young with a vestige of the thallus albo-pulverulent, usually nudate, to ·5 mm., orbicular, convex, immarginate, rough and opaque, partly confluent; asci globose,

8-spored; spores from hyaline finally nigricant, 16-21 x 7-9 μ, 4-locular; the upper loculus large and undivided, the others longitudinally 1-2-septate.

Hab.: On bark, Darling Downs, *Bailey*, No. 682.

A. macrotheca, *Mull. Arg.* Thallus greatly varying, yellowish or whitish, rugulose, asperulate, farinulent or evanescent; apothecia when young albo-suffused, but usually nude black or fuscescent when moist; epithecium brown or brownish; hypothecium hyaline; asci subglobose, large, 6-8 spored; spores when mature hyaline, 45-65 x 16-26 μ, finely parenchymatous, the cubical locelli in 14-18 transverse series, with 3-6 in each row.

Hab.: On bark, Cairns, *Shirley*, No. 1826.

SARCOGRAPHA.

Fée Meth. Lich. p. 20; Ess. p. 58, et Sup. p. 43; Mull. Arg. L.B. 1100.

S. (s. Phæoglyphis) oculata, *Mull. Arg.* Thallus whitish ochroleucous, thin, continuous, smooth, opaque; stromata to 1·5 mm. wide, hemispherical, outline regular, or faintly obtuse-angulose, here and there confluent, concolorous with the thallus and equally levigate, about 4-8-fruited; apothecia orbicular, when dry black (whence the stromata are nigro-oculate), when moist brownish, at first slightly pruinose, to ·3 mm., neither emergent nor with disk depressed; perithecium indistinct; hypothecium and lamina hyaline; epithecium brown; spores 8, brown, 25-37 x 7-8 μ, obtusely fusiform, 7-10-locular.

Hab.: On bark, Brisbane scrubs, *Bailey*, No. 783.
Syn.: *Glyphis labyrinthica*, Stirton non Ach, pro. p.

CHIODECTON.

Ach. Syn. p. 108; Mull. Arg. Graph. Fée, p. 65.

C. hamatum, *Nyl.* Thallus white ashy, thin, opaque, somewhat farinaceous; apothecia in rotundate, convex or flattish thalline verrucæ, which are concolorous with the thallus or whiter, to 1 mm., immersed, with 6-12 black ostiola in each verruca; spores 8, fusiform, finely attenuate below, the apex curved like a hook, 7-septate, 62-75 x 35-55 μ. In appearance resembles *C. sphærale*.

Hab.: On bark, Cairns, *Shirley*; Eumundi, *Field Naturalists*.

C. virens, *Mull. Arg.* Thallus pallid-virid or greenish, thin, smooth, margin girdled by a nigro-fuscous non-byssoid zone; stromata paler than the thallus, to ·5 mm., from orbicular to elongate, straight, curved, or incurved, semicylindrical-convex, in length 3 times the width, bearing apothecia in one series; apothecia ·1-·16 mm., at first orbicular, then very elongate, more or less confluent, brown-black and nude; perithecium lateral, indistinct; hypothecium thick, black; spores 8, clavate-acicular, 35-42 x $2\frac{1}{2}$-3 μ, straightish, 4-locular.

Hab.: On bark, Mount Perry, *Shirley*, Nos. 1785, 1838 pr. p., and 1849.

ASTEROTREMA.

Mull. Arg. Lich. Pal. Æg. p. 8, No. 32.

Thallus none apparent; apothecia of one hymenium, mouth at length dehiscent, astroid-lobate, with small denudate disk; paraphyses very slender, clathrately connected; asci like those of *Arthonia*; spores from hyaline to brown and brownish, transversely divided.

A. punctuliforme, *Mull. Arg.* Thallus white or glaucous, very thin, roughish, opaque; apothecia numerous, black, ·08-·13 mm. wide, punctuliform, at first thalline velate, usually nudate, opaque, and black, opening in an irregular star-shape, when mature slightly emergent; perithecium lateral, rufo-nigrous; spores 8, in oblong-obovoid asci, 12-13 x 6 μ, obovoid, brown, 2-locular.

Hab.: On bark, Sankey's Scrub, *Shirley*, No. 1855.

Tribe PYRENULEÆ.

Mull. Arg. Pyr. Cub. p. 381.

Sub-tribe I.—VERRUCARIEÆ.

Mull. Arg. Lich. Gen. p. 73; Pyr. Cub. pp. 376 and 398.

ARTHOPYRENIA.

Mull. Arg. Pyr. Cub. p. 376.

A. (s. Mesopyrenia) suboculata, *Mull. Arg.* Thallus a pale-clay colour, very thin, continuous, and smooth or smoothish; apothecia black, to ·5 mm., hemispherical, regular, opaque, vertex obsoletely impressed and brownish; perithecium wanting at the base or there very attenuate; paraphyses loosely connected; spores 8, 13-16 x 6½-8 μ, at both ends obtuse, 4-locular.

Hab.: On bark, *Knight*, No. 199.

PORINA.

Mull. Arg. L.B. No. 644.

P. (s. Segestrella) fulvula, *Mull. Arg.* Thallus pallid olivaceous, continuous, rugulose-scabrid; apothecia to ·25 mm., deeply fulvous, hemispherical, appressed-sessile; spores 8, 18-25 x 4-5½ μ, fusiform, 4-locular.

Hab.: On maritime rocks, Thursday Island, collected by *Hartmann*; *Knight*, No. 265, 275, pro p.

P. (s. Euporina) pallida, *Mull. Arg.* Thallus pallid-green, very thin, finely rimulose, elsewhere smooth, at length evanescent; apothecia to ·7 mm., flavescent or whitish-subfulvescent, hemispherical, from regular at length obsoletely gibbose; ostiola fulvous or rufescent-fulvous; spores 8, when evolute 37-40 x 10 μ, stoutly fusiform, 8-locular.

Hab.: On maritime rocks, Thursday Island, *Knight*, No. 275, pr. p.

Order FUNGI.

POLYSTICTUS, Fries.

P. bulbipes, *Fries; Polyporus cladonia*, Berk.; and *P. perdurans*, Kalch. Cinnamon; pileus between coriaceous and membranaceous, flaccid, regular, fibrously radiate, on one colour (2½-5 cm. broad); disc umbilicate; margin reflexed dentate; stem regular, cylindrical, velvety, bulbous (2½ cm. long); pores crowded, thin, entire, at first tawny, then cinnamon, not at first pruinate.—Cooke's Handb. Austr. Fungi, 138.

Hab.: A few of the above grew up in a hard rocky yard, during February of 1896, in Brisbane.

TRABUTIA, Sacc. and Roum.

(Named after Dr. L. Trabut, a botanist of Algiers.)

Stroma black, radiating, flattened; perithecia adnate to the stroma; ostiolum pierced; sporidia ovoid-oblong, hyaline.—Cooke's Handb. Austr. Fungi.

T, Pithecolobii (n. sp.), *Cke. and Mass.* Epiphyllous, innate. Perithecia seated on brown orbicular spots (1 cm. diam.), convex, rather crowded, those of the periphery forming a more or less distinct ring, covered by the cuticle. Asci clavate; sporidia elliptical, at first nucleate, continuous, 15-16 x 6 μ, hyaline. Received from Dr. M. C. Cooke for this publication.

Hab.: Eumundi, on leaflets of *Pithecolobium Tozeri, Field Naturalists' Excursion.*

LÆSTADIA, Auersw. (After Dr. C. P. Læstadio.)

Sporidia continuous, hyaline.

GENUINA. Without paraphyses.

L. destructiva, *B. and Br.*, Cooke's Handb. Austr. Fungi, 310; *Sphærella destructiva*, Berk. and Br., in Synopsis of Queensl. Flora, 781. Perithecia minute, seated on brown spots. Asci short (75 μ long); sporidia subelliptic, rather attenuated at the base, 12 μ long, hyaline.—*Cooke l.c.*

Hab.: Very frequent on badly cultivated lucerne. First met with February 1879, by Dr. Joseph Bancroft at Kelvin Grove; and the writer at Indooroopilly, on lucerne.

PHYSALOSPORA. With paraphyses.

L. xerotifolia, *Cke. and Mass.* On both surfaces. Perithecia solitary or gregarious, on small indeterminate greyish spots depressedly globose, small, black; ostiolum short, splitting the cuticle. Asci clavate; sporidia biseriate, continuous, elliptical, 7-8 x 3, 5-4 μ, hyaline. Received from Dr. M. C. Cooke for this publication.

Hab.: Eumundi, on leaves of *Xerotes longifolia, Field Naturalists' Excursion.*

ASTERINA, Lév.

A. cryptocaryæ, *Cooke* (n. sp.) (From the host-plant, *Cryptocarya*). Epiphyllous. Spots orbicular, scarcely distinct; mycelium sparse, delicate, of a few creeping brown septate threads. Perithecia membranaceous, scutate, gregarious on the spots, margin irregular. Asci clavate; sporidia sublanceolate or subelliptical, bilocular, unequal, constricted, pale-brown, 20-22 x 8 μ. Received in letter from Dr. Cooke.

Hab.: On leaves of *Cryptocarya glaucescens* at Eumundi, *Bailey and Simmonds.*

PHYLLOSTICTA, Pers.

P. evodiæ, *Cooke* (n. sp.) (From the host-plant, *Evodia.*) Spots large, semiorbicular or angular, ochraceous, sometimes circumscribed by a line, on both surfaces. Perithecia on the upper or both surfaces, small, gregarious, brown, semi-immersed, perforate, often seated upon and following the veins; sporules narrowly elliptical, 6-8 x 4 μ, on slender basidia. Received in letter from Dr. Cooke.

Hab.: On leaves of *Evodia accedens*, Yeppoon, *Mr. W. Broome.* The spots are conspicuous for their size and colour, sometimes apical, and sometimes in the centre of the leaf. The circumscribing line not constant.

ADDITIONS TO THE NEW GUINEA FLORA.

DENDROBIUM, Sw.

Section Pedilonium.

D. Dixsoni (n. sp.) Stems slender, more or less enlarging at the centre, internodes short, about 1¼ in. long, either clothed by the leaf-sheaths or their thready remains. Leaves linear or oblong-lanceolate, 4 or 5 in. long, 8 or 9 lines broad, the margin folded in at the base for about the length of an inch, obtuse, and very unequal-sided at the apex, texture coriaceous. Flowers in a dense short raceme near the end of the leafless stems, deep rosy-pink except the labellum, which with a part of the column is of a deep orange. Pedicels with ovary about 6 lines long. Bracts lanceolate, 6 lines long. Sepals about the same length as the bracts, lanceolate; dorsal one slightly incurved, the lateral ones somewhat spreading, all apiculate. Petals ovate-lanceolate, shorter than the sepals, apiculate. Labellum entire linear-lanceolate, ½½ lines long, deep orange, especially towards the apex; texture thick, but showing neither plates or calli on the disk. Spur curved. Column short, the wings narrow, reaching halfway up the anther in blunt minute denticulate lobes. Anther cordate, compressed, with a dense white tomentose border in front. Pollen-masses brown.

Hab.: New Guinea.

D. Dixsoni, var. eborinum (n. var.) This differs from the typical form only in having all the segments of the flowers a creamy-white, except the labellum, which in both kinds is of a deep orange. The present variety seems to have rather larger flowers.

Hab.: New Guinea.

CIRRHOPETALUM, Lindley.

C. graveolens (n. sp.) Rhizome thick, shortly creeping. Pseudobulbs conical, 3 or 4 in. high, with numerous very prominent angular ribs. Leaves thickly coriaceous, obovate, 12 in. long, 4½ in. broad towards the top, tapering from above the middle and becoming almost petiolate. Scapes about 6 or 7 in. high, bearing a short raceme 7 in. in diameter, composed of about 13 yellowish, strongly scented flowers, which are so crowded as to appear almost umbellate. Sheathing scales 2 near the base, the lowest very obtuse; bracts subtending, the flowers spreading, ovate-lanceolate, about ¾ in. long. Pedicels, with the ovary, which is short and prominently grooved, about 1½ in. long. Flowers glossy, yellow, tinged with green, the inner face of all the segments more or less speckled with red. Dorsal sepal about 1 in. long, ½ in. broad, apiculate, marked with 9 nerves, incurved over the column; lateral sepals exceeding 1½ in. in length, coherent nearly throughout, but the one shorter than the other; the two united about 7 lines broad and obtuse at the end, or sometimes shortly separated, and the apex of each more or less pointed, each 3-nerved. Petals about 5

lines long and 3 lines broad, the midrib exserted in the form of a bristle. Labellum versatile, reddish-brown, turning to deep-purple, canaliculate, and curved almost into a circle, apex blunt or somewhat elongated, the base bluntly lobed. Column-wings somewhat rhomboid, the upper point or tooth reaching above the anther Anther-lid glossy, except for a little tomentum in front.

Hab.: New Guinea. The plant now blooming in the Botanic Garden greenhouse was brought to Brisbane a few years ago by Sir William Macgregor. It is a showy species, but the strong disagreeable odour of its flowers will probably prevent it becoming a favourite in cultivation, except where collections of these curious and beautiful plants are kept. The strong odour of the flowers seems to have the effect of attracting and stupefying flies, so that, when by the turning over of the labellum they become jammed between that organ and the column, they are unable to extricate themselves, and die in the position. This stupefying effect is produced by some other similar strong-scented flowers.

GUMS AND RESINS EXUDED BY QUEENSLAND PLANTS CHEMICALLY AND TECHNOLOGICALLY DESCRIBED.

By Dr. JOSEPH LAUTERER, M.D.

The inspissated juices of living plants exuded from wounds on the surface or from the inside of disintegrated tissues, mostly dried up by exposure to air, may for practical purposes be classified into four groups—

1. Resins, unaltered by and insoluble in water.
2. Gums, swelling up in or entirely dissolved by water.
3. Gum-resins, composed in the fresh state of an inspissated emulsion of a resinous body insoluble in water, derived from an essential oil, and held in suspension by a watery solution of a kind of arabin.
4. Tan-resins, partly soluble in water, leaving an insoluble residue which is derived from a tannin, and which residue is soluble in caustic potash and sometimes in alcohol.

A.—RESINS.

I. Resins soluble in strong caustic potash with intense colouration. Not derived from an essential oil, but from a tannin.

1. Alcoholic solution reddish yellow, getting golden yellow on addition of caustic potash. *Xanthorrhœa arborea*, R. Br.
2. Alcoholic solution pure yellow, getting greenish on addition of caustic potash. *Xanthorrhœa hastilis*, R. Br.

II. Resins not dissolved entirely by caustic potash and, if dissolved, showing only a slight colouration.

1. Drying up only after some days or weeks (soft resins).
   (*a*) Fresh resin destitute of a pungent aromatic taste and smell, not reminding of turpentine. *Ailanthus imberbiflora*, var. *Macartneyi*, Bail.
   (*b*) Taste and smell of the fresh resin, reminding of turpentine or lavender or nutmegs.
      (*aa*) Ferric salt gives colour reaction with fresh alcoholic solution of the resin.
         (1) Ferric salt stains the fresh alcoholic resin solution green. (Smell of lavender.) "Tacamahac," from *Calophyllum inophyllum*, L.
         (2) Ferric salt stains the alcoholic resin solution violet, turning into Indian red and brown. (Smell of turpentine.) *Syncarpia Hillii*, Bail.
      (*bb*) Ferric salt gives no colour reaction with fresh alcoholic resin solution.
         (1) Caustic potash without reaction on the alcoholic resin solution; 20 per cent. of a colourless essential oil smelling like oil of Strasburg turpentine are distilled over at 165° C., and a colourless hard resin is left in the still. *Canarium Muelleri*, Bail.
         (2) Caustic potash gives a yellow colouration to the alcoholic resin solution. *Pittosporum undulatum*, Vent.

2. Resin drying up soon after it is exuded. (Hard resins.)

A. Watery infusion of the resin yellow, exhibiting a beautiful and very strong blue fluorescence, which is destroyed instantly on addition of the slightest trace of acid or acid salt. *Evodia alata*, F. v. M.

B. Watery infusion of the resin pale, not exhibiting any fluorescence.

a. Resin dissolved by chloroform; alcoholic solution brown.

aa. Alcoholic solution red-brown, giving with ferric chloride a grey-green colouration, turning pink on addition of ammonia. Caustic potash gives a beautiful violet reaction with the alcoholic solution. *Grevillea striata*, R. Br.

bb. Alcoholic solution dark brown, altered by ferric chloride into grey black, which is restored to dark brown on addition of ammonia. Caustic potash changes the dark brown of the alcoholic solution into yellow brown. *Myoporum platycarpum*, R. Br.

b. Resin insoluble in chloroform or nearly insoluble; alcoholic solution pale yellow or colourless, not brown.

aa. Resin in form of tears with a mealy surface, very brittle and easily powdered. No trace of arabin. Caustic potash colours the alcoholic solution with a golden yellow. Essential oil distilled off the resin smells like frankincense. ("Sandarac.") *Callitris calcarata*, R. Br.

bb. Resin tough, not mealy on the surface; not in tears. Caustic potash produces a pale yellow colouration in alcoholic solution.

1. Resin in large masses like a man's fist or head, resembling the New Zealand copal, very transparent on the surface, but of a pinkish yellow inside, containing only traces of arabin. Essential oil, distilled off the resin, smells like Oleum Carvi. Resin fossil. (Queensland "Copal"). *Agathis robusta*, Benth and Hook.

2. Resin in smaller pieces, containing 3 per cent. of arabin. Essential oil, distilled off the resin, smells like Oleum Petroselini. (Queensland "Dammar.") *Agathis robusta*, Benth. and Hook.

B.—GUMS.

AA. Astringent Gums.—Dilute watery solution coloured green or blue on addition of ferric acetate.

I. Out of the watery solution the whole gum is precipitated as a greenish black (gelatinising) mass on addition of ferric chloride (dilute). (Brigalow Gum from) *Acacia harpophylla*, F. v. M.

II. Gum not precipitated out of the (dilute) watery solution by ferric chloride.

1. Green colouration produced by ferric salt.
   a. Concentrated sulphuric acid makes a pink-brown colouration. All reagents give colouration without much precipitating. ***Baloghia lucida***, Endl.
   b. Concentrated sulphuric acid makes a fox-red precipitate. All reagents make coloured precipitates. ***Bombax malabaricum***, D.C.

2. Blue coloration produced by ferric salts. Gums containing a phlobaphene coloured pink by alkalies.
   a. Gum solution yellow brown with a strong blue fluorescence. Uranium acetate gives a light-brown precipitate. ***Calophyllum tomentosum***, Wight.
   b. Gum solution pink-brown, without fluorescence. Uranium acetate gives a dark-brown precipitate.
      aa. Ether takes a small amount of a colourless resin out of the gum solution, which dissolves in caustic potash with a yellow colouration.
         1. Potassium cyanide turns the phlobaphene of the gum solution to a beautiful pink. ***Lonchocarpus Blackii***, Benth.
         2. Potassium cyanide stains the phlobaphene in the gum solution more brown than pink. ***Millettia megasperma***, F. v. M.
      bb. Ether does not take out any resinous matter.

Eucalyptus.

1. Eucalypt gums containing between 30 and 40 per cent. of arabin and not over 40 per cent. of tannin. Gums insoluble in alcohol if not dissolved in water first; soluble in water if not too old:—***Eucalyptus resinifera***, Sm.; *E. siderophloia*, Benth.; *E. robusta*, Sm,; *E. crebra*, F. v. M.; *E. saligna*, Sm.
2. Eucalypt gums containing not over 6 per cent. of arabin or metarabin and sometimes less, by 60 to 70 per cent., of tannin. Gums entirely soluble in alcohol and totally soluble in water:—***Eucalyptus acmenioides***, Schau.; *E. eugenioides*, Sieb.; *E. piperita*, Sm.; *E. Planchoniana*, F. v. M.; *E. haemastoma*, Sm.; *E. pilularis*, Sm.; *E. tereticornis*, Sm.

BB. Gums not Astringent.—Ferric acetate does not stain.

I. Gum entirely soluble in water, containing only arabin.

1. Watery gum solution opalescent, giving up the opalescent body ("Grevillea-resin") to ether. Ferric chloride (and ferric acetate) gelatinises the watery gum solution only on addition of caustic potash (or if perfectly neutral) and the ferric gum gelatine is dissolved by acids but not by caustic potash, not even on boiling. ***Grevillea robusta***, A. Cunn.
2. Watery gum solution not opalescent.
   a. Watery gum solution even in a dilute state gelatinising quickly with ferric chloride, but not gelatinising with borax even in a thick state.

1. Alcohol precipitates the gum out of the solution without addition of caustic potash. Silicate of soda gelatinises the solution slowly. *Melia composita*, Willd.
2. Alcohol precipitates the gum out of the watery solution only on addition of caustic potash. Silicate of soda does not gelatinise the solution at all. *Albizzia Toona*, Bail.

b. Watery gum solution in a dilute state not gelatinising with ferric chloride but gelatinising with borax (if not too thin).

1. Gum, precipitated by alcohol in a test-tube, is dissolved again in the alcohol on addition of 2-3 drops of hydrochloric acid. *Flindersia maculosa*, F. v. M.; *Flindersia Strzeleckiana*, F. v. M.
2. Gum, precipitated by alcohol in a test-tube, is dissolved again in the alcohol only on addition of 12-15 drops of hydrochloric acid. *Acacia dealbata*, Link.

II. Gums insoluble or only partly soluble in cold water; at least a residue of metarabin (only swelled up) is left on the bottom of the vessel.

1. Gum insoluble and only swelling in cold water.

a. Forming in cold water a trembling colourless jelly, looking like boiled tapioca or like spawn of frogs. Gum not dissolved in boiling water, but dissolved by short boiling in caustic potash solution. *Macrozamia spiralis*, Miq.

b. Forming in cold water whitish granules like soaked rice, or forming a paste like tragacanth or rice-meal paste.

aa. Gum forming in cold water a paste like rice-meal paste; dissolved quickly in boiling caustic potash solution and also dissolved gradually in boiling water. The alcoholic precipitate from water is stained canary-yellow by caustic potash. *Hibiscus heterophyllus*, Vent.

bb. Gum forming in cold water whitish granules like soaked rice, dissolved in caustic potash on prolonged boiling, and in water only by boiling for many hours. Alcoholic precipitate from watery solution not stained canary-yellow by caustic potash solution.

1. Gum in the dry state looking much like tragacanth. *Sterculia trichosiphon*, Benth.; *Sterculia rupestris*, Benth.; *Sterculia quadrifida*, R. Br.
2. Gum in the dry state looking like a dark gum. *Terminalia Catappa*, L.

2. Some of the gum soluble in cold water.

a. Solution even in a dilute state gelatinising quickly with ferric chloride, but not gelatinised by borax. *Albizzia Toona*, Bail.

b. Solution not gelatinising in the dilute state with ferric chloride, but gelatinising with borax if not too thin.

aa. Watery solution stained greenish on addition of alcohol with formation of a white precipitate. Caustic potash solution stained yellow on addition of alcohol. *Cedrela Toona*, Roxb.

bb. Watery solution giving only a white precipitate with alcohol, but not stained yellow.

1. Part of the gum, left undissolved by cold water, is stained golden-yellow by cold caustic potash solution. *Castanospermum australe*, Cunn.
2. Part left undissolved in cold water not stained golden with caustic potash.

a. Metarabin dissolved by boiling hydrochloric acid is precipitated by alcohol in the sour state. *Bauhinia Hookeri*, F. v. M.

b. Metarabin dissolved by boiling hydrochloric acid is precipitated by alcohol only on addition of alkalies.

aa. Metarabin is dissolved by cold caustic potash. *Acacia Cunninghamii*, Hook.

bb. Metarabin is dissolved by caustic potash only on boiling.

1. Part of the dissolved metarabin falls out after cooling. *Acacia decurrens*, Willd.
2. Metarabin solution in caustic potash keeps clear after cooling. *Acacia penninervis*, Sieb.

C.—GUM RESINS AND TAN RESINS.

(Dissolved in water but only partly.)

I. Part soluble in water, not stained blue by ferric salt. Dry distillation yields phenol and catechol.

Gum Resins.

1. Part, soluble in water, consists of metarabin, stained yellow by KOH (before it is dissolved by it) and not gelatinising with ferric salt. (Page 50.) *Pittosporum undulatum*, Vent.
2. Part, soluble in water, consists of a kind of arabin, gelatinising on addition of ferric salt.

a. Arabin gelatinising with ferric salt without addition of caustic potash; ferric gelatine dissolved by caustic potash

aa. Resin very tough, looking like tallow, with scarcely a smell. *Araucaria Cunninghamii*, Ait.

bb. Resin more yellow and transparent; smell of turpentine more decided. *Araucaria Bidwillii*, Hook.

b. Arabin gelatinising with ferric salt only on addition of caustic potash. *Grevillea robusta*, A. Cunn.

II. Part soluble in water stained blue by ferric salt. Dry distillation yields pyrogallol (and phenol).

Tan Resins (astringent gums containing a tan resin).

1. The part insoluble in water is very sticky at 30-35° C, and adheres to the fingers, or it can be drawn out into slimy threads under water and in the air. Tan resins containing benzoic acid (not always).

a. Watery solution of a pale yellow colour. *Eucalyptus maculata*, Hook.

b. Watery solution brown, greenish yellow on dilution. Ferricyanide of potassium in ammonia makes a beautiful crimson and pink colouration. *Eucalyptus tessellaris*, F. v. M.

2. Part insoluble in water, not sticky to the fingers.
   a. Watery solution when filtered making for months and months a sediment (again and again) of ellagic acid, dissolved in KOH, with intense yellow colouration.
      1. Watery solution pale brown. *Angophora lanceolata*, Cav.
      2. Watery solution dark brown, pink on dilution. *Angophora intermedia*, DC.
   b. Watery solution when filtered making only a sediment once, or no sediment at all.
      aa. Watery solution of a blood-red colour, giving green reactions with alkalies. *Eucalyptus corymbosa*, Smith.
      bb. Watery solution of a brown colour, but on dilution with water turning into a magnificent pink (on an opalplate). Ferricyanide of potassium in ammonia produces a magnificent crimson.
         1. Watery solution diluted on an opalplate shows a magnificent pink colour. *Eucalyptus viminalis*, Labill; *Eucalyptus Stuartiana*, F. v. M.; *Eucalyptus goniocalyx*, F. v. M.
         2. Watery solution diluted on an opalplate shows only a yellowish green colour. *Eucalyptus microcorys*, F. v. M.

ORIGIN OF THE GUMS AND RESINS FROM THE LIVING PLANT.

The gums and resins of Australia have been examined by me with reference to their origin from the living plants by which they have been exuded, and the following results have been obtained:—The gums and resins can thus be classified: The first class of gums contains vegetable exudations, which are nothing else but the inspissated juices of the cells, and of the young vascular tissue of the plant. They are exuded only from wounds on the surface, and consist exactly of the same constituents as an artificial extract prepared from a watery decoction of the plant. This first class of gums embraces the gums of the Papilionaceæ, *Lonchocarpus Blackii*, and *Millettia megasperma*; and the gums of the ruby group of the eucalypts, *e.g.*, *E. haemastoma*. The gums of the turbid group, *e.g.*, *E. maculata*, *E. corymbosa*, &c., differ slightly from the artificial extracts of the plant, as they contain a gum resin derived mostly from the essential oil of the eucalypts.

A second class of gums is formed by gums which have nothing to do at all with the juice contained in the cells and in the young vascular tissue. Their chemical constitution is totally different from that of the artificial extract of the plant. They are derived from the cellulose of the cell walls by a degeneration, or by retrograde metamorphosis. The cell walls can degenerate into vegetable slime, metarabin, bassorin, and arabin. Nearly all the gums exuded by the Malvaceæ are nothing else but inspissated vegetable slime. They have (with one exception to be mentioned directly) nothing in common with the bassorin of the tragacanth. The gums of the Sterculias belong to this group. If soaked in water they swell up to granular masses, with scarcely any adhesiveness, and resembling boiled rice. Mr. Maiden has pointed out the similarities and dissimilarities between the Sterculia gum and gum tragacanth, and he doubts if there really exists such a body as

bassorin in Australia. I had the luck to find true bassorin in the gum exuded by *Hibiscus heterophyllus*. This gum swells very much in cold water, forming a sticky paste like rice-meal paste, and altogether different from the granular masses formed by soaked Sterculia gum. The Hibiscus gum is dissolved in water on prolonged boiling. The solution does not gelatinise with ferric chloride, but the dissolved gum is precipitated by alcohol, and the precipitate is stained canary yellow on addition of caustic potash. The gum of *Hibiscus heterophyllus* is dissolved quickly in diluted caustic potash on boiling, whereas the Sterculia gum gives way only slowly and gradually to boiling KOH. Hibiscus gum solution gets yellow by this process. In dilute hydrochloric acid it is dissolved on boiling. Alcohol precipitates arabin from this solution, and Fehling's test shows the presence of sugar in it.

These reactions indicate the identity of Hibiscus gum with gum tragacanth, and its total discrepancy from the gum of the Sterculias.

Metarabin is a very common product of retrograde metamorphosis in plant life. The gum of *Macrozamia spiralis* represents a pure metarabin gum, containing none of the constituents of the plant itself.

Many gums consist of metarabin mixed with arabin. Nearly all our Acacia gums belong to this category. They do not (with the exception of the brigalow gum) contain a trace of tannic acid or of any of the other chemical matters of the wattle bark or of the sap of the acacias. They never contain any saponin, which is common in the pods of nearly all Acacias, and which was first found by Dr. T. L. Bancroft in a wattle from the North.

The arabin of the gum resins is derived from the same degeneration of the cellulose of the cell walls. Our Araucarias contain a very variable amount of arabin, according to the different state of weather during which they have been exuded. The Araucaria arabin gelatinises energetically with ferric chloride even in a dilute solution.

A third class of gums embraces those where the metarabin or arabin contains some constituents of the sap from which it is derived.

The gum of *Ceratopetalum gummiferum* (the Christmas bush), the gum of the Moreton Bay chestnut (*Castanospermum australe*), and the gum of some species of *Pittosporum* consist of arabin and metarabin, stained with a yellow vegatable dye, which gets brown by ferric chloride and golden yellow by caustic potash.

The Eucalyptus gums of the gummy group, including *Eucalpytus siderophloia*, *E. crebra*, &c., contain about as much tannin as arabin (40 per cent.).

A fourth class includes all the resins formed by oxydation of an essential oil, as the resins of *Dammara robusta*, known as Queensland dammar and Queensland copal. Large quantities of this copal, resembling closely the New Zealand copal from *Dammara australis*, have been found lately in a fossil state somewhere in Queensland.

The Queensland sandarac, from different species of Callitris, is altogether identical with the sandarac of commerce, derived from the *Callitris quadrivalvis*.

The resinous part of our gum resins from the Araucarias belongs to this class too.

The fifth class receives gums and resins which differ in their chemistry absolutely from anything contained in the living plant.

The resins of the grass-trees give an instance of this. Not one compound of the Xanthorrhœa resin is to be found inside of the bark of the stem, or inside of the cuticula of the leaves, or in the tissue of the flowers or fruits. The resin seems to be derived from Xanthorrhœa tannin, but the way in which this is turned into the resin is up to the present date altogether enigmatical.

HARD RESINS, DISSOLVED IN *KOH* WITH STRONG COLOURATION.

Xanthorrhœa arborea, R. Br., Fl. Austr. vii. 115. Grass-tree. This grass-tree, which grows 10 or more feet high, has only a small conical piece of wood in the basal part of the stem. From this wooden stem arise the fibrovascular strings with dotted and scalariform fibres, which go upwards to the persistent bases of the old leaves and to the young leaves too. There is not a proper bark, but a layer of white parenchymatous tissue about 1 line thick (3 mm.) covers the whole stem, and through this tissue the vascular fibres emerge from the stem to enter into the grassy leaves.

All the cells of this tissue are crammed full of needles of oxalate of lime about 4 micromillimetres long and very thin. Each cell contains about 60 needles. Here and there rhombic plates of the same salt (examined by microscopical reagents) take the place of the needles.

As no plant on the whole earth is known to contain such a large number of rhaphides, and as the grass-tree resin is just exuded from this tissue all over the grass-tree stem between the bases of the leaves, it is evident that the oxalate of lime has something to do with the production of the resin from the tannate contained in the leaves. The whole grass-tree stem is thoroughly free from tannin as well as of the colouring matter contained in the resin. The tannin contained in the grassy leaves will be described further on.

The resin of *X. arborea* is dark-brown and very brittle. It has a bright fracture with pellucid edges, and can easily be reduced to a powder a shade darker than bichromate of potassium. The resin of *X. arborea* has a pleasant aromatic (taste and) smell, which is at least partly due to styrol. This substance, called also cinnamene (C_8H_8), was obtained by me, on distillation at a very moderate heat, from fresh grass-tree resin. Found by Stenhouse as early as 1846, it was not recognised then as styrol. Still it gives with HNO_3 crystals of nitro-styrol easily observable under the microscope, and on further heating with HNO_3 the smell of bitter almonds is noticed. As it is easily oxydised to benzoic acid, this latter substance only is to be found in old resins, and the styrol being present in fresh exudations might be absent altogether.

The resin of *X. arborea* melts at a moderate heat, but does not get sticky before melting. It burns with a smoking flame and with a pleasant odour. It is easily dissolved in alcohol, ether, alkalies, baryta, and lime-water. The alcoholic solution has a reddish-yellow colour. Ferric salt stains it brown; KOH produces a golden yellow colouration, especially on diluting with water. If a drop of H_2SO_4 is added to the alcoholic resin solution, the colour changes into a bright blood-red, mixed with crimson on the marginal part. This colour

after some standing is altered into yellow and brown. HCl makes a slight precipitate, and HNO_3 produces an orange colouration.

The resin solution in Na_2CO_3 has a sweetish bitter taste.

Chloroform dissolves only a small part of the resin, and the same part is dissolved again or taken out of fresh resin by glacial acetic acid.

In benzol the *X. arborea* resin is altogether insoluble.

Solid fats, lucca oil, paraffin, wax, and glycerin mix very nicely with melting grass-tree resin, but on cooling the resin settles to the bottom, and the admixed body separates from it, taking up only a small amount, including the colouring matter. Lucca oil and glycerin obtain a bitter, sweetish taste after separating from the resin. If water is added to the glycerin, part of the dissolved resin falls out, and the colouring matter stays in solution, and can be taken out by ether. It is stained golden-yellow with KOH (nearly brown, if concentrated). H_2SO_4 makes the glycerin solution brown; on addition of water yellow, not purple (like *X. Tateana*). The resin not dissolved in glycerin, if dissolved in alcohol, reacts with H_2SO_4 like entire grass-tree resin. H_2SO_4 dissolves the resin at first with a light-brown colouration. It is then nearly insoluble in alcohol. After some time it becomes brownish-yellow, and is then easily dissolved in spirit with the same colour as dragon's blood. The alcoholic solution reacts now very much like that of dragon's blood. It becomes yellow on addition of H_2SO_4 (on opal plate), as it was before, and as dragon's blood gets when treated with sulphuric acid; with KOH it gets purple like dragon's blood gets pink.

Cold water takes very little out of the *X. arborea* resin. If boiled with water in a water-bath for a long time, a little more gets dissolved. If this watery solution is dried up by evaporation and this extract is heated, it does not smell of the grass-tree resin at all; small oildrops are sublimated over, getting hard and of crystalline texture. If the opening of the ether bottle comes near they are quickly dissolved and crystallise afterwards; water dissolves them, and ferric acetate stains the solution brown-black. KOH gives a golden-yellow reaction. The crystals consist of the yellow colouring matter to be mentioned directly.

Boiling water makes a pale-yellow infusion with the resin, showing the following reactions:—Ferric and ferrous salts produce an olive-brown, and by standing a bulky brown, precipitate. Gelatine makes a slight precipitate in the resin infusion (whereas the tannin of the grass-tree leaves gives a good precipitate). Alkaloids like sulphate of cinchonine are precipitated very much by the resin-infusion (whereas the tannin of the leaves does not make a precipitate at all). Alkalies (KOH, NaOH, NH_4OH, Na_2CO_3), cyanide of potassium, limewater, and alum change the pale liquid into a bright golden solution unaltered by drying up. Borax produces a reddish-yellow colouration.

Mineral acids like HCl make the resin infusion turbid, the turpidity being caused by microscopic globules like in an emulsion.

These reactions, together with the slightly astringent taste, made it likely that a tannin was contained in the grass-tree resin infusion; but on boiling with diluted HCl no phlobaphene or gallic acid or ellagic acid could be obtained. So only a body derived from a tannin could be expected, and this body was taken out of the solution

altogether by shaking it with ether. The ether deposited on evaporation bushy bundles of whitish crystals, which were only slightly soluble in cold or hot water, alcohol, and ether, and altogether insoluble in chloroform (therefore no benzoic acid). They did not melt on application of heat (no benzoic acid) ; but they dissolved rapidly in alkaline watery solutions with intense yellow colouration. The infusion from the grass-tree resin, after having been shaken with the ether, no more turned golden by addition of KOH. It got pink now (like it gets when shaken before with animal charcoal, but the filtrate acts in this case on ferric salt, alkaloids, and gelatine). Ferric acetate no more produced a brown precipitate, and gelatine and sulphate of cinchonine were added without turbidity.

Infusion of grass-tree gum acts very peculiarly on addition of chloroform. If a few drops of this are added, crystalline prisms are seen to fall out of the watery liquid and to settle just on the surface of the chloroform. Some of them are rounded, and look like a scythe-stone under the microscope. They behave to ferric salt and KOH like those taken up by ether, which dissolves them quickly. They can be sublimated without decomposition, and they represent the yellow dye of natural origin contained in the grass-tree resin. We might call it *Xanthorrhœaxanthin*. It is derived from the tannate of the leaves, like the yellow colouring principles—Quercitrin, Moric acid, and Luteolin, and comes nearest to this last one. Luteolin (from *Reseda luteola*, L.) shares with *Xanthorrhœaxanthin* the brown reaction with ferric salts, the precipitation of gelatine, the golden-yellow reaction with alkalies, the turpidity with mineral acids, the astringent taste, and the sublimability over 300° C. Concentrated sulphuric acid changes the yellow colour of the *Xanthorrhœaxanthin*, like that of the similar carotin, into a bright blue violet or crimson. A vegetable dye nearly related to the colouring matter of the grass-tree resin was found by me in the gums of *Castanospermum australe* (also in the bark), *Ceratopetalum gummiferum*, and in the bark of *Pittosporum undulatum*.

The tannin contained in the grass-tree leaves is stained green by ferric salts, pink by KOH. Copper acetate gives a slight precipitate. Alkaloids are not precipitated by it. Gelatine gives a dense precipitate. Boiled in dilute HCl a light-brown phlobaphene falls out, soluble in alcohol, and there stained brown by KOH and H_2SO_4.

If the watery infusion of the *X. arborea* resin is treated with acetic ether, beautiful crystals of benzoic acid are taken out, melting on application of heat, and crystallising again on cooling. The benzoic acid present in the resin can be weighed directly by this process, and I found it to be contained in fresh resins at 5-6 per cent.

By the action of chlorine I tried to bleach the grass-tree resin dissolved in different mediums, but when it had fallen out white it got dark on standing. Dry distillation splits the resin up into phenol (hydrate of phenyle, Stenhouse), giving a blue mixture with ammonia and bleaching powder.

From 20 grams of grass-tree resin I obtained 5 grams of picric acid in the following manner:—20 grams of the powdered resin, mixed with 240 grams of HNO_3, was given in a glass retort with a receiver. After an hour's time a gentle heat was applied to the retort, and the fluid which went over was poured back from the receiver into the glass

retort as long as there was a smell of N_2O_4 to be observed. When this had disappeared the contents of the still were further heated until a brownish-yellow clear liquid was formed, out of which the picric acid crystallised on cooling.

The turbidity produced by lead acetate in an alcoholic resin solution is due only to the *Xanthorrhœaxanthin*?

For commercial purposes the resin of *X. arborea* is scarcely of any value, on account of its partial solubility in water and its perfect solubility in caustic potash. The solution in spirit looks like a splend.d brown paint or varnish, but if the air is a little damp the painted surface suddenly changes colour and becomes a dirty brown. Soapy water dissolves the varnish very quickly, and the least drop of it leaves a mark on the painted surface. On metal like, say, tin or brass this resin varnish shows at first a very pretty golden lustre, but after a rainy day the shiny surface looks dim and is of a dirty brown colour.

For medicinal use the grass-tree resin is not without value. It stops diarrhœa if given as a powder in doses of 1 drachme or more, but there are so many remedies better in this respect that it is scarcely necessary to prefer it to the astringents. On account of the benzoic acid and the cinnamene, the grass-tree resin is an excellent antiseptic for badly healing wounds and ulcers. A fresh solution in hot fat or oil, as well as a watery decoction, can be strongly recommended for external application on chronic ulcers and other painless sores, especially on the presence of a bad smelling discharge.

Xanthorrhœa hastilis, R. Br., Fl. Austr. vii. 115. Stradbroke Island Grass-tree The first settlers in New South Wales have already noticed the resin of this tree, and thought it might be a kind of shellac, but as it is too easily dissolved in alkaline liquids it is altogether useless as a varnish. It contains more impurities than the resins of the two described species. It contains a high amount of benzoic acid derived from styrol by oxydation. The alcoholic solution is pure yellow; ferric salt makes a brown precipitate, KOH stains it greenish. Boiling water dissolves some of the resin with a faint yellow colouration.

This infusion is stained red-brown by ferric salt; KOH produces a yellow-brown colouration with a greenish tint; borax gives a pale-brown reaction with a yellow tint. The infusion precipitates alkaloids and gelatine. The solution in H_2SO_4 looks brown. It is dissolved on an opal plate with a colour between violet-brown and Indian-red, turned yellow-brown on addition of H_2SO_4, and violet with KOH.

ANALYSIS—

	H. arborea.	*H. hastilis.*
Resin soluble in alcohol	93·5	82·0
Benzoic acid	5·6	9·4
Impurities	0·5	8·0
	99·6	99·4

SOFT RESINS.

Ailanthus imberbiflora, var. *Macartneyi*, Bail., Bot. Bull. x. From the stem of this endemic East Australian tree, when it is cut down or wounded, a resin exudes in quantities of many gallons, looking like a whitish untransparent varnish. It does not get hard

on exposure to air for months and months. When heated to 100° C., 14 per cent. of water are evaporated, and a yellowish quite transparent resin is left, which as before keeps sticky in open bottles for any length of time.

It dissolves entirely in rectified spirit and in the immiscible liquids (chloroform, ether, acetic ether, benzol, and petroleum spirit). It dissolves also in the essential oils (oil of eucalypt) and in hot lucca oil, and melts nicely together with paraffin, wax, and the fats.

The solution in alcohol is not stained by ferric salt, but gets yellow on addition of KOH.

Ailanthus resin is not affected by strong KOH solution, whereas strong H_2SO_4 makes it swell and changes its colour to a light-pink, especially to be noticed on an opal plate.

Hot water melts the resin only, and takes traces of the essential oil (shortly to be mentioned) out of it, wherefrom it retains the peculiar smell. When heated to a yellow liquid, a colourless essential oil of a slightly bitter taste and an acrid sweetish smell like that of the resin itself, not reminding of any other essential oil, is distilled over. It is lighter than water, and boils at 185° C. It forms 7-8 per cent. of the whole resin. Ailanthus resin in alcohol gives, on addition of sugar of lead, a white precipitate which, by treatment with H_2S, yields a sticky resin, called by me Ailanthus resin. The resin not precipitated from the alcoholic solution by lead acetate is not so sticky as the Alpha resin.

Analysis of Ailanthus Resin—

Water	7·3
Essential oil	9·5
Alpha resin	23·6
Beta resin	55·4
Impurities	3·8
	99·6

The essential oil of *Ailanthus imberbiflora* resin agrees in its properties with that of *Ailanthus glandulosa*. It may be supposed, therefore, to act similarly to that; and indeed 2 drachmes of the *A. imberbiflora* resin dissolved in lucca oil and given to a big dog produced strong purging. Very likely it acts as an anthelmintic too. While I worked with the hot resin, sublimating the oil or mixing it with fats, &c., I felt a nauseous sensation coming over me. The oil of *A. glandulosa* is said to have a very decided effect of depression on the nervous system, and to cause vomiting when inhaled. The bark of the same tree is used in 20-grain doses for the expulsion of the tape-worm.

The *A. imberbiflora* resin makes a good ointment for chronic ulcers, used pure or mixed with wax and lard. Fresh cuts and sores are not to be treated with this resin on account of the acrid oil. Technically, the resin might be adhibited for softening too hard and too quickly drying alcoholic varnishes, especially for tin and smooth metal surfaces, where a brittle varnish is liable to fall off after drying in the sun. With wax and turpentine it makes a good paste to fix paper labels permanently on tin boxes.

Calophyllum inophyllum, Linn., Fl. Austr. i, 183. The Domba-tree of India exudes from its trunk a dark-green oleo resin called in

India "Tacamahac," a name which, according to Dymock, ought to be restricted to the resin of *Calophyllum calaba*, a native of Ceylon. It is tasteless (book states it to be bitter), and has a peculiar smell reminding of oil of juniper, or of parsley (as Dymock says), more especially of *Apium leptophyllum*.

It is very adhesive at the ordinary temperature, and melts between 60° and 70° C. It dissolves with grass-green colour in alcohol ether, chloroform, acetic ether, amylic-alcohol, and benzol. It dissolves also in glacial acetic acid with bright-green colouration. Strong sulphuric acid dissolves it with golden-yellow colour, changed into brown after some time. This colour fades away on addition of alcohol. Strong caustic potash solution dissolves the resin with a greenish-yellow colouration. Vegetable fatty oils and animal fats dissolve it on application of heat. Hot glycerine takes only a small amount of the resin, and gets opalescent on cooling. The alcoholic solution of the resin is stained beautifully light-blue (on an opal plate or china plate) by ferric chloride, a reaction which it shares with guajac resin. Permanganate of potash is only reduced to a brown colour by tacamahac solution, whereas guajac solution is stained beautifully blue by this oxydizing agent. Concentrated nitric and sulphuric acid stains the alcoholic solution of tacamahac golden-yellow; diluted nitric acid produces only a green colouration.

If the alcoholic solution be put on the just broken surface of a potato, it gets blue, like guajac solution.

From the resin a colourless volatile oil distils over on heating, which has the peculiar smell of tacamahac. The oil is not dissolved (well) in alcohol and glacial acetic acid. Concentrated sulphuric acid stains it yellow; nitric acid gives with it a yellow liquid with violet oil drops on the surface, or it produces a pink colouration. It gives no reaction if heated with alcoholic pyrogallol, or resorcin solution and hydrochloric acid. Iodine is dissolved in the oil with a brown colouration, changing into green after a while. This iodine-compound is stained pink by nitric acid, and decolourised by sulphuric acid.

The volatile oil of tacamahac discolours alcoholic iodine in one minute.

These reactions show that this oil comes nearest to the oil of juniper berries.

As the colour reaction of tacamahac resin with ferric chloride might lead to the conclusion that it contains a tannate, it must be stated that such a body could not be detected in the resin. The bark of *Calophyllum* contains about 3 per cent. of a tannin and a small amount of a phlobaphene, giving a brown solution with water, looking pink if diluted with water on an opal plate. The tannin, unlike the resin, gets green by ferric chloride, and purple on addition of ammonia. It coagulates gelatine and alkaloids energetically.

By caustic potash solution the *inophyllum* tannin is stained pink and brown, not yellow like the resin.

Rhede says that the resin is emetic and purgative. It is mostly used externally for plasters, like turpentine. It has found its way from India to Europe, and was called "tacamahaca in testis," because it was sent to the market in gourd-shells covered with rush-leaves. It is scarcely to be met with in chemists' shops, and no chemical

details respecting this interesting resin have been recorded up to now in the literature.

Syncarpia Hillii, Bail., Syn. Ql. Flora, 1st Suppl. p. 23. The "Peebeen" or Turpentine-tree of Fraser Island. This endemic Queensland tree, with a rough deeply furrowed bark and ovate pointed leaves, exudes from wounds of the trunk and the branches and from the top of the fruiting-heads (the calyces of which are connate) a soft yellow resin which gets greenish or light-brown on drying. It has the exact odour and taste of the turpentine from *Abies excelsa*, DC.

This resin is dissolved with a brown (green) colour in alcohol, ether, chloroform, benzol, and the essential oils. Sulphuric acid has no action on it.

The fresh alcoholic solution gives a blue-violet colouration, with ferric acetate turning into Indian red and brown, which colour is changed into light-brown on addition of ammonia. Old solution is liable to give only brown reactions, as $FeSO_4$ does in fresh solutions. KOH, NaOH, NH_4OH, Na_2CO_3, as well as borax, produce a golden-yellow colour in an alcoholic solution of Syncarpia resin. Strong H_2SO_4 throws the resin out undissolved; acetate of copper produces a greenish-yellow colouration, turned green on addition of ammonium carbonate.

These reactions are not due to a tannin; they belong to a colouring matter nearly related to that of *Xanthorrhœa*, *Castanospermum australe*, *Ceratopetalum*, and *Pittosporum undulatum*. The tannin contained in the bark of *Syncarpia Hillii* gives different reactions. Ferric salt stains it blue, purple on addition of ammonia; KOH gives pink; NH_4OH, only brown colouration; copper acetate produces a pink-brown precipitate; ferri-cyanide of potassium in ammonia stains the Syncarpia tannin pink; whereas the same reagent produces only a yellow colour in alcoholic resin solution, owing to the ammonia. Gelatine and sulphate of cinchonine are precipitated by the tannin. Antim. tartar gives only a precipitate on addition of NH_4Cl.

These reactions open a wide gap between the tannate of Syncarpia and the yellow dye of the resin.

If Syncarpia resin is heated, a colourless essential oil distils over, to which its smell is due. It is not identical with the volatile oil contained in the oil-cells of the foliage; it swims on water.

The resin is hard after the elimination of this oil, and resembles colophony. It is dissolved easily in alcohol as well as in the immiscible solvents.

ANALYSIS—

Volatile colourless oil (estimated by loss of weight of the resin)	10·5
Yellow brittle resin (dissolved by alcohol)	75·4
Impurities insol. in alcohol	5·8
	99·8

The resin of *Syncarpia Hillii* can be put to the same services as the Strasburg turpentine; especially it can be used as a healing agent on chronic ulcers and sores like the best Hamburg plaster, as has been proved in many cases.

Dr. T. L. Bancroft sent (in 1891) from the Johnstone River to Mr. Bailey an oleo resin which he had found copiously flowing out of a tree, and which the Colonial Botanist found to be a new species

of the Indo-Australian genus *Canarium*, and named by him *Canarium Muelleri*.

The Government Analyst, Mr. Mar, examined this oleo resin, and gave his opinion as follows:—"The substance in bottle marked turpentine is a resin resembling elemi in its general chemical characteristics."

As much as 4 oz. of the material was then sent by Mr. Bailey to Mr. Maiden, who gave a paper on the subject to our Royal Society, which was read on 11th December, 1891. In this paper Mr. Maiden vigorously objects to Mr. Mar's statement, though the Pharmacopœa of India finds the resin of *Canarium commune* from India to possess a strong odour of elemi. The reason for this opposite view is given by Mr. Maiden as follows:—"The most careful tests have failed to detect any acicular crystals (amyrin) in the oleo resin of *C. Muelleri*, nor have attempts to obtain a crystallisable resin from the same substance been successful. Under the microscope no trace of crystalline form can be discovered either from solution in alcohol, ether, chloroform, &c. From these and other comparative tests it appears that this oleo resin and elemi are neither identical nor allied."

To settle the question, I started a new series of investigations on the resin put kindly at my disposal by Mr. J. F. Bailey, and I found the statement of Mr. Mar to be quite correct. The resin of *Canarium Muelleri* is nearly related, and perhaps identical with the Manila elemi.

It contains an immense amount of acicular crystals of Baup's elemin, melting at 200° C., and soluble in 20 parts of alcohol of 88 vol. per cent., but much less soluble in benzol and in volatile oils than the uncrystallised resin. The crystals can only be seen under a high-power objective, and they look much like the raphides of the banana-tree. Very slender and delicate in the strongly refracting resin, they gain a boldly marked aspect under the microscope if they have been pressed between filter-paper and isolated from the amorphous resin. In benzol or lavender oil they look very distinct, too.

The fresh resin of *Canarium Muelleri* is an oleo resin of the colour and consistency of honey. It is very adhesive, and in physical properties resembles very much the Strasburg turpentine, to which it is somewhat related.

It is soluble in the immiscible liquids, but dissolves slowly and imperfectly in ordinary alcohol, on account of the slight solubility of the essential oil contained in it. It consists of—

1. Volatile oil (26 p.c.) identical with the oil of Manila elemi, and nearly related to the light oil of nutmegs (*Oleum myristicæ*). It is not easily soluble in alcohol, but dissolves quickly in glacial acetic acid. Nitric acid gives no colour reaction at first, and dissolves the oil afterwards with pink colouration. Sulphuric acid produces a golden-yellow colour, which is changed quickly into a beautiful pink. It is coloured slightly pink by an alcoholic solution of pyrogallol on addition of hydrochloric acid and heating. It dissolves iodine with brown colouration, and the iodine compound is stained with pink by nitric acid, and first discoloured and then stained pink by sulphuric acid. Tincture of iodine is discoloured in a minute. These reactions

are identical with those of the essential of Manila elemi, and come near those of oil of nutmegs, which differs from our oil mostly by exploding with iodine and by getting more brown than pink with nitric acid, according to Wallach (1890). The elemi oil contains dextro phellandrene dipentene and a crystalline compound, which is probably Westerberg's amyrin.

2. Amorphous resin, easily soluble in alcohol, and perhaps identical with the colophony of turpentine.

3. Crystallised resin, identical with Baup's elemin, melting at 200 degrees C., and not easily dissolved in benzol, but soluble in 20 parts of alcohol of 88 vol.

As to the commercial value of the resin, it must be stated that it is the best substitute for elemi, and that it is a very good healing agent for cuts, sores, and chronic ulcers, as it has been proved by experiments.

Pittosporum undulatum, Vent., Fl. Austr. i. 111. Mock Orange. This endemic Australian shrub exudes in dry times from wounds in the bark a soft resin which contains only traces of metarabin. It can be described here, though in and after the rainy season such a high amount of metarabin is present as to justify its classification with the gum resins. The resin is nearly colourless, and, as Mr. Maiden remarks, has a delicious odour. It dissolves almost entirely in alcohol, ether, chloroform, benzol, and the essential oils, but sometimes up to 17 per cent. of metarabin are left.

On application of heat a colourless volatile oil is distilled off, floating on water and reminding one of the smell of the flowers. The resin left behind is hard and nearly colourless. Its alcoholic solution is not affected by ferric salts, but is stained yellow by KOH, owing to a colouring matter related to that of *Castanospermum australe*, *Xanthorrhœa*, and *Ceratopetalum*. It seems to be a derivative of the tannin contained in the plant, which (combined with the yellow dye) has the following reactions: Ferric salts, green, purple with ammonia; ferricyanide of potass. in ammonia, yellow and brown; alkalies (KOH, $\tilde{N}aOH$, NH_4OH) and ammon. molybdate in HNO_3, golden yellow; antimon. tartar with NH_4Cl. no reaction; copper acetate with NH_4CO_3 no reaction; uran. acetate light-brown. Does not coagulate gelatine but precipitates sulphate of cinchonine, resembling in this respect the yellow colouring matter of *Xanthorrhœa*.

The gum present at times (metarabin) contains the same yellow dye and is stained golden by KOH.

ANALYSIS—

A.	Vola ile oil	12·8	B.	Volatile oil	8·2
	Hard resin	84·2		Hard resin	74·0
	Metarabin	2·5		Metarabin...	17·7
		99·5			99·9

HARD RESINS.

Grevillea striata, R. Br., Fl. Austr. v. 462. Beefwood. The resin of this endemic Australian tree has been described by Mr. Maiden as quite free from odour and of a dark reddish-brown colour. It has a bright fracture, but softens by the warmth of the hand, to which it adheres. It melts at 70° C., but does not at first get tough

like pitch. It does not burn well, and melts together with paraffin, wax, and solid fats. It dissolves in hot lucca oil, to which it imparts its brown colour. It is soluble in alcohol, ether, chloroform, oil of eucalypt, but *not* in benzol. H_2SO_4 dissolves some of it with decomposition and grey colouration.

The solution in alcohol is reddish-brown. It is altered to greyish-green by ferric chloride, and then to pink on addition of ammonia. KOH and NaOH stain the alcoholic solution first brown and then beautifully *violet*, which colour on addition of HCl is changed into red-brown and yellow. Ammonia gives only brown reactions. The solution in oil of eucalypt gets violet with KOH, that in lucca oil gets yellow with KOH and violet only on addition of alcohol. If heated over 200, the boiling resin is sublimated over without decomposition, as the sublimate gives the same reactions as the resin. On stronger heating the products of dry distillation are obtained, and between them can be recognised catechol and phenol.

The alcoholic solution gives a precipitate with sugar of lead, which on decomposition by H_2S yields a brown resin, to be called Alpha-Grevillia resin.

ANALYSIS—

Resin not precipitated in the alcoholic solution by sugar of lead	79·0
Resin precipitated by sugar of lead	21·0
	100·0

The Grevillea resin can be used as a substitute for pitch medicinally, and even technically where toughness and stickiness is not looked for.

Myoporum platycarpum, R. Br., Fl. Austr. v. 7. Sandalwood of N.S.W. This tree, which, with the exception of Tasmania, is found in all the Australian colonies, exudes a tasteless dark-brown resin in small globular masses, easily powdered in cold weather, or when old. Mr. Maiden has analysed the resin (1889). Cold water has no effect on it. It melts in boiling water and dissolves entirely (my sample) in alcohol, ether, and chloroform to a brown liquid, becoming more yellow on dilution. Benzol and the volatile oils (oil of eucalypt) dissolve it also.

The solution in alcohol is stained greyish green by ferric salts, and this colour is turned back into brown by addition of ammonia. By KOH the brown colour of the alcoholic solution is changed into yellow-brown.

H_2SO_4 dissolves the Myoporum resin (yellow-brown), and this solution dissolves well in alcohol. No colour reactions with acids or KOH.

The resin of Myoporum can in all proportions be easily melted together with wax, paraffin, oils, and solid fats. The mixtures are light or dark brown. Lucca oil is coloured nicely red-brown by the resin, and if equal parts of each are taken a good soft ointment is produced. The solution in oil of eucalypt is dark-grey.

The resin melts under 100° C., and burns with a smoking flame. A part of the resin can at 300° C. be sublimated over as nearly colourless resinous drops soluble in all the reagents which dissolve the resin of Myoporum. Especially chloroform takes it up quickly and leaves it as concentric rings on evaporation. If heated

over 300° C. the Myoporum resin splits up and yields phenol. From 20 grams of Myoporum resin I obtained 2·4 grams of picric acid by heating it with 240 grams of HNO_3.

As Mr. Maiden's resin was not dissolved entirely in alcohol and petroleum spirit, the Myoporum resin (collected by myself on the Lachlan) must undergo variations from the atmosphere and perhaps from bush fires also.

Callitris calcarata, B. Br. (*Frenela Endlicheri*, Parlat.), Fl. Austr. vi. 238. Cypress Pine. This Queensland tree yields a transparent, colourless, fragrant resin, with a vitreous fracture, and a mealy surface in the form of tears, somewhat resembling the sandarac of commerce from *Callitris quadrivalvis*. It is very easily powdered, and softens in boiling water. It has a specific gravity of 1·07, and does not melt so easily as the sandarac of commerce. On cooling it hardens to a brittle mass resembling pumice-stone.

It is nearly insoluble in chloroform and benzol. Chloroform makes the sandarac swell and crumble to a powdery mass on the bottom of the bottle. (Queensland Dammar goes to the top of the chloroform.)

The Queensland sandarac dissolves entirely in alcohol and ether. The alcoholic solution gives a precipitate with sugar of lead (in spirit) not dissolved by boiling. H_2S takes Unverdorben's Alpha resin out of this precipitate. Chloride of calcium makes another precipitate in the alcoholic solution after addition of KOH, and splits the rest of the resin up in Beta and Gamma resin of Unverdorben. The identity of the Queensland sandarac with that of the commerce is established by these reactions.

The alcoholic solution of the resin is stained beautifully yellow by KOH. Ferric salt gives no reaction.

Oil of eucalypt dissolves the Queensland sandarac to a yellow oleo resin. KOH makes it swell, and dissolves it partly to a sticky yellow soap. H_2SO_4 has no effect on it at first, and dissolves it after some time with decomposition. If heated to 200° C. 4·8 per cent. of a colourless volatile oil is distilled over, floating on water, and has an odour like the oil of *Juniperis communis*, reminding one a little of frankincense.

ANALYSIS—

Volatile oil	4·8
Alpha resin, precip. by sugar of lead	26·4
Beta resin, precip. in KOH by $CaCl_2$	33·5
Gamma resin, left in, KOH falling out by HCl	35·0
	99·7

Sandarac was formerly given internally, and entered into the composition of various ointments and plasters. At present it is used chiefly as a varnish and as incense; its powder is rubbed upon paper to prevent ink from spreading after letters have been scratched out, and is called "pounce." The best varnish for maps, pictures, &c., on white paper is prepared by dissolving 12 parts of sandarac and 5 parts of mastic in 32 parts of strong spirit. The paper must be sized before with a solution of gelatine.

Agathis robusta, Benth. and Hook. Gen. Pl. Syn. Ql. Fl. 498. Dundathu Pine.

1. Queensland Dammar.

This endemic Queensland tree, the nearest relation to the Kauri pine of New Zealand (*Agathis australis*), yields a hard resin in large quantities, exuded from wounds in the bark. It is of a yellowish-white colour, transparent, and of a vitreous conchoidal fracture. It melts at a moderate heat, and has a smell like that of *Oleum carvi* and *Ol. petroselini*. Its specific gravity was found by me to be 1·06. It looks very much like the commercial dammar, and can be styled Queensland dammar, but it is not identical with it, as no crystals could be obtained from a solution in boiling alcohol, or from any other solvent.

It is dissolved by alcohol, with a small residue, which is partly soluble in water (consisting of arabin). An insoluble part might be identical with Dulk's dammarylhydrate.

The alcoholic solution of the Queensland dammar is not stained by ferric salts. KOH gives a yellow colouration.

Chloroform dissolves only a small proportion of the resin, including the volatile oil, but it disintegrates it, and the half-solid layer swims to the top of the chloroform, which gets a yellow colour by the dissolved resin. In benzol the Queensland dammar is insoluble. H_2SO_4 dissolves it after some time. The bluish-black solution is taken up by alcohol, and then stained pink on addition of KOH. Oil of eucalypt dissolves the Queensland dammar. If heated near 200° C a colourless volatile oil distils over in greater quantity than ought to be expected. It floats on water, and has a smell between *Oleum carvi* and *Ol. petroselini*.

Analysis—

Volatile oil	8·4
Resin soluble in chloroform	6·8
Resin insoluble in chloroform	84·2
	99·4

Queensland dammar might be used as an ingredient for varnishes. A very good pellucid adhesive plaster can be made by melting together 8 parts of Queensland dammar, 6 parts of Canarium resin, 3 parts of white wax, and 8 parts of castor oil or Ailanthus resin.

2. Queensland Copal.

This fossil resin has lately been found in large quantities, but the locality is at present only known to the discoverer. It looks much like the New Zealand copal on the surface, but the inner parts are not so transparent and have a pinkish-yellow colour. There have been pieces found larger than a man's head. The Queensland copal has a vitreous conchoidal fracture, softens at 100 degrees (so that it can be drawn out in strings) and melts at a higher temperature. Its specific gravity is 1·07. Alcohol and ether dissolve it easier than the dammar, and scarcely any residue is left. In chloroform, benzol, petroleum, and oil of turpentine the resin is practically insoluble.

The alcoholic solution is stained a little greenish-black sometimes by ferric acetate. KOH produces a yellow colouration in it. Oil of eucalypt dissolves the Queensland copal. Fats, wax, and paraffin melt together with it, but not easily.

On stronger heating comparatively much volatile oil goes over miscible with the most solvents, floating on water and having the smell like that of *Oleum carvi* with a little of that of *Oleum terebinthinæ*.

ANALYSIS—

Volatile oil	8·5
Moisture	5·4
Resin	86·0
	99·9

Queensland copal can be used nearly as well as New Zealand copal for making varnishes. If it is heated in close vessels to 350° to 400° C. it becomes soluble in benzine and oil of turpentine. Heated with one-third of linseed oil and three-fourths of oil of turpentine it gives directly a clear varnish fit for the most delicate uses.

ASTRINGENT GUMS.

Acacia harpophylla, F. v. M., Fl. Austr. ii. 389. Brigalow. This Queensland brigalow yields a light or dark-brown gum, which is highly interesting to the scientific chemist. It has a sour, astringent taste, and is entirely soluble in cold water, forming a mucilage as sticky as that of arabic gum. It has a specific gravity of 1·06, and contains 18 per cent. of water.

The "brigalow-arabin," which forms the bulk of the brigalow gum, is so closely united to the catechutannic acid contained in it, that it is almost impossible to separate one from the other. Not arabin is precipitated from a brigalow gum solution by alcohol, but the arabin united with the catechutannic acid, in other words, the whole brigalow gum (minus the organic acids to be mentioned further on). The water filtered off from the precipitated gum contains only traces of tannin (coloured green by Fe_2Cl_6, whereas the precipitate is coloured quite black by ferric salt). If only a small amount of HCl. is added to the solution of the brigalow gum, it no more falls down with alcohol, unless a large excess of this is added.

The (white) precipitated gum in alcohol is dissolved quickly on addition of a few drops of HCl., and it falls out (yellow or brown) if the solution is neutralised (with KOH). A small excess of the alkali redissolves this precipitate, and more alcohol must be added to make it fall down again. Ferric chloride not only precipitates the catechutannin, it also coagulates the "brigalow arabin" united with the tannin, that is to say, the whole brigalow gum, as a greenish-black cheesy mass (from a thick mucilage) looking much like blacking. In a more dilute (20 per cent.) gum solution a greenish gelatine is produced. This precipitate is dissolved entirely by KOH with a purple colouration, and in this alkaline solution a fresh precipitate is formed by alcohol. This precipitate after prolonged washing with alcohol in a percolator yields the pure brigalow arabin. It gelatinises with ferric salt, the formed gelatine being dissolved by KOH.

The tannin of the brigalow gum is present from 3 to 6 and more per cent.; low percentage is the rule. The tannin differs from the tannin of most Australian wattle barks (*Acacia linifolia*, *A. Cunninghamii*, *A. penninervis*, and *A. mollissima* were compared), and comes nearest to catechutannic acid. It was obtained pure by extraction of

abrigalow-gum solution with acetic ether, and by sugar of lead and H_2S. It has the following reactions:—Ferric salt stains it green, turned purple by ammonia; other wattle barks give delicate blue reactions. Antimon. tartar. gives only a precipitate on addition or NH_4Cl. (*A. linifolia* bark gives a precip. with ant. tart. alone; the other wattles only with NH_4Cl.) Copper sulphate light brown precipitate, darkened by ammonia. (*A. mollissima*, light brown with $CuSO_4$, violet blue like catechutannin with ammonia.) Limewater greenish-yellow to greenish-brown (*A. mollissima* purple). Ammon. molybdate in nitric acid light-brown, like the barks. Picric acid in ammonia, violet.

KOH, NaOH, NH_4OH, greenish brown. Pot. cyanide greenish-brown with a pink tint. The tannin precipitates gelatine and the alkaloids, and yields a brown-red phlobaphene on boiling with dilute HCl. Dry distillation yields catechol. The colouring phlobaphene contained in the brigalow gum is of a brownish-yellow colour. Acids make it lighter, alkalies change its colour to brown.

The acid taste of the brigalow gum is due to malic and tartaric acid. The acids were found out as follows:—To the brigalow-gum solution (acidified with acetic acid) lead acetate was added in excess. The precipitate was filtered off, the lead eliminated (by H_2S) from the filtrate, the precipitate filtered off again, the second filtrate treated with alcohol to get rid of the arabin, the third filtrate concentrated, divided into several portions and examined.

1. To one portion lime water was added in the cold. A slight gelatinous precipitate separated immediately. This precipitate, when washed and heated in a test tube with a drop of dilute ammonia and a crystal of silver nitrate, gave the brilliant mirror characteristic of tartaric acid.

2. Chloride of calcium in excess was added to a second portion. No precipitate was formed, indicating absence of oxalic acid.

3. Chloride of calcium was added to a third portion just to neutralise the reaction, and then alcohol was added, when a white precipitate of malic acid was formed.

ANALYSIS—

Water	18·0
Brigalow arabin, gelatinising with Fe, ...	70·5
Catechutannic acid	3·5
Soluble phlobaphene	trace
Tartaric and Malic acid (only estimated by evaporation to dryness)	8·0
	100·0

The highest amount of catechutannic acid in a dark-brown piece of brigalow gum was 9 per cent. The arabin of the gum is never turned into metarabin by the effects of the atmosphere (like the gums of the Eucalypts are).

Bombax malabaricum, DC., Fl. Austr. i. 223. Silk Cotton-tree. The astringent gum of this tree has been mentioned by Mr. Maiden in his book (1889) as—"Only exuding from portions of the bark which have been injured by decay or insects. Incisions produce nothing." The gum was obtained by me from a kind of gall on the twigs. It dissolves with a red-brown colour, and has a sour reaction. It contains 17 per cent. of water and much impurity.

The Bombax gum undergoes alterations by atmospheric influence so as to become nearly insoluble (metarabin) in water.

The bulk of the gum is formed by a kind of arabin, thrown out of a watery solution without addition of acid or alkali. The precipitate dissolves on addition of a few drops of HCl or of KOH solution. It does not gelatinise with ferric salt, and is present at 24 per cent. in the impurified gum.

The tannin contained in Bombax gum is present at 33·5 per cent. Ferric salts stain it grass-green with brown precipitation, turning purple-blue on addition of ammonia (like the tannin of *Acacia mollissima*). Alkalies produce a brown, limewater a pink-brown colouration. Copper acetate gives a light-brown precipitate insoluble in carbonate of ammon. Antimon. tartar. makes a white precipitate only on addition of NH_4Cl. Lead acetate and lead nitrate give white precipitates. That by ammon. molybd. in nitric acid is pink or red-brown, like that by uranium acetate. The reaction by ferricyanide of potassium in ammonia is pink or crimson. All precipitates are of a bulky nature, like those of the gummy group of Eucalyptus gums. Gelatine, albumine, and the alkaloids are very much precipitated in the watery solution of Bombax gum. A red-brown phlobaphene is deposited in the watery solution after boiling with dilute HCl. Dry distillation yields catechol.

Analysis—	
Water	17·3
Arabin	20·5
Metarabin	16·4
Impurities	12·3
Tannin	33·5
	100·0

Baloghia lucida, Endl., Fl. Aust. vi. 148. Scrub Bloodwood. The blood-red sap which oozes from the trunk when cut was examined by me on several occasions. It hardens to a red gum, resembling the gummy drops on cut stems of Millettia and Lonchocarpus. There is very little gummy matter present under the form of arabin thrown down from the solution by alcohol with alkali on standing. It amounts to 4-6 per cent. The gum solution "forms an indelible paint," but inferior to the solutions of *Eucalyptus corymbosa* or even *E. siderophloia*. No starch corpuscula are contained in the sap of this Euphorbiaceous plant The dyeing properties are due to the blood-red phlobaphene which is turned red-brown by KOH and pink-brown by H_2SO_4. The tannin is present in the dried exudation at more than 75 per cent., the colouring phlobaphene included. Its reactions come very close to those of Bombax gum. Ferric salts stain the solution grass-green, purple if ammonia is added; ferrous salt gives no reaction, but addition of ammonia produces purple colouration. KOH, NaOH, NH_4OH, borax, potass. cyanide, and limewater give a pink-brown; ferricyanide of potassium in ammonia gives a pink colouration. Antimon. tartar. makes a precipitate only on addition of NH_4Cl; ammon. molybdate in HNO_3 gives a brown precipitate, made lighter by acids. The precipitate of uranium acetate is brown, those of lead acetate and lead nitrate are white. Gelatine, albumin, and alkaloids are precipitated by Baloghia gum solution. All precipitates are delicate owing to the small amount of arabin present and thrown out together with the salts. The red-brown phlobaphene precipitated after boiling with dilute HCl resembles that of Bombax gum. Dry distillation yields catechol.

ANALYSIS of the inspissated juice—

Water	18·7
Arabin	4·5
Tannin (derived from protocatechuic acid) ...	76·8
	100·0

Calophyllum tomentosum, Wight, Syn. Ql. Fl., p. 28, and Cat. of Ql. Woods, p. 13. Poon Spar-tree. This Indo-Australian tree yields a feebly astringent dark-coloured gum, which is quite soluble in water, which it stains a yellow-brown colour. The bulk of it consists of arabin precipitated from the solution by alcohol without addition of acid or alkali. It is not coagulated by ferric salts, but faintly stained blue by them.

The watery solution of the gum has a strong blue fluorescence exactly like the esculine from the bark of *Æsculus Hippocastanum*. This fluorescence is destroyed by slight acidulation, and recovered by neutralisation or alkalisation, exactly as it is the case with esculine. The fluorescent body is bound to a colouring matter turned golden-yellow by KOH, whereas the tannin of *C. tomentosum* gets pink by this reagent. It is not present in old bark (of *tomentosum* or *inophyllum*), as a decoction of it does not show any fluorescence.

The tannate contained in the Calophyllum gum is only present at 3·5 to 4 per cent. Its reactions are disguised in the gum solution by those of the body turned yellow on addition of alkalies, which is not taken out by acetic ether. Separated by this from it, it shows the following reactions:—Ferric salt, blue; purple with NH_4OH. KOH, NaOH, NH_4OH produce a magnificent pink colouration; cyanide of potassium does that in a smaller degree. Acetate of copper makes a pink-brown precipitate, rendered a shade darker by carbonate of ammonia. Uranium acetate and $CuSO_4$ give a light-brown; ammon. molybdate in HNO_3, a yellow-brown precipitate. Na_2S produces a brown reaction, and ferri-cyanide of potassium in ammonia gives a pink-brown precipitate. The tannin of *C. tomentosum* precipitates gelatine, albumen of eggs, and alkaloids. It yields a red phlobaphene when boiled with dilute HCl.

ANALYSIS—

Water	18·5
Tannin stained blue by Fe^{VI}, ...	4·0
Arabin	77·5
Fluorescent body	traces
	100·0

Lonchocarpus Blackii, Benth., Fl. Austr. ii. 271. Bloody-bark. This tall woody climber exudes a blood-red juice, which on exposure to air dries up to a brownish gum resembling the gum of *Eucalyptus corymbosa*. Still, the watery solution of the gum has more the colour of *E. siderophloia*.

There is not more than 4 per cent. of arabin present in the gum, precipitated by alcohol on standing.

Ether takes a still smaller proportion of a resin out of the watery decoction, which is held suspended in it like in an emulsion. It is deposited on a watch-glass in concentric rings after the evaporation of the ether.

The colouring phlobaphene of *L. Blackii* gives the same reactions as that of the gum of Millettia and as the Eucalypt gums of the gummy and ruby group.

The tannins of Lonchocarpus, Millettia, and of the Eucalypts of the said group appear to be totally identical. The reactions given by tannin solutions of Lonchocarpus and Millettia are exactly the same which take place with the respective Eucalypt gums to be described further on.

The tannin of the gum of *L. Blackii* is present at 75 per cent., yields pyrogallol by dry distillation and a yellow-red phlobaphene if boiled in dilute HCl.

ANALYSIS—

Arabin	3·8
Resin soluble in ether, alcohol, chloroform, and benzol	1·4
Tannic acid	74·2
Water	20·6
	100·0

Millettia megasperma, F.v. M., Fl. Austr. ii. 211. The gum of this tall climber was examined first by Mr. Maiden, who found it to contain 78 per cent. of tannin and 20 per cent. of water. It looks very like the Eucalypt gums of the ruby group. The fresh solution in cold water has (mostly) an opalescent appearance owing to the presence of a resin, identical with that of *Lonchocarpus Blackii*, and is soluble in alcohol, ether, and chloroform. The percentage of this resin is different in different samples of the inspissated juice; there is never more of it than 1·5, and generally less. The arabin which is precipitated with difficulty by alcohol on standing amounts to 3·5 or less.

The colouring phlobaphene is stained a deeper brown by cyanide of potassium and does not get so beautifully pink like that of *Lonchocarpus Blackii*. It agrees in all other respects with the phlobaphene of *L. Blackii* and of the Eucalypt gums to be mentioned further on, and the same is the case with the tannin contained in the Millettia gum.

ANALYSIS—

Arabin	3·5
Resin	1·4
Water	20·0
Tannin	75·1
	100·0

EUCALYPT GUMS ENTIRELY SOLUBLE IN WATER.

The Eucalypt gums which are entirely soluble in cold water, all agree with each other in some essential respects.

1. They all contain 15-20 per cent. of water in the air-dry state.
2. They all contain a tannin, which is stained delicately blue by ferric salt, in a dilute solution. This tannin has nothing to do with kinotannic acid as it yields pyragallol by dry distillation.*
3. The phlobaphene, which forms the colouring matter of these gums, is identical in all, giving a beautiful pink colouration with cyanide of potassium (and with all alkalies more or less).

* This was pointed out first by the writer in a paper read in January, 1895, before the Aust. Assoc. for Advancement of Science (in Brisbane).

I. The tannin of the Eucalypt gums which are soluble in cold water was obtained pure by precipitating it with lead acetate, filtrating and by splitting up the washed precipitate with H_2S. It was also obtained pure by saturating the gum solution with NaCl, shaking it with acetic ether and eliminating the arabin by addition of alcohol. After evaporation of the acetic ether the tannin is dissolved in water, and this solution shows the following reactions (also observed with the tannin of Millettia and Lonchocarpus) :—Ferric acetate gives a delicate blue reaction, changed to purple and brown on addition of NH_4OH. Alkalies and cyanide of potassium produce a pink colouration in the tannin solution. Acetate of copper makes a light brown precipitate, which gets dark-brown on addition of carbonate of ammonia. Lime-water produces a green-brown precipitate in a pink liquid. Ammon. molybdate in nitric acid gives a brown precipitate. Ferricyanide of potassium in ammonia has a pink-brown, NA_2S a brown reaction. Acetate of uranium gives a dark-brown precipitate. That produced by lead salt is pinkish.

These reactions come near those of quercitannic acid, but they are all lighter, more pink than brown. From gallotannic acid our tannin differs essentially, by giving a light-coloured phlobaphene when boiled with dilute HCl. This phlobaphene is soluble in alcohol, and gives a pink solution with caustic potash. Dry distillation of the Eucalypt tannin produces pyrogallol, as the following experiment shows:—One gram of a gum of this group is heated for twenty minutes in 3 grams of pure glycerin to 200° C. A deep-brown solution of syrup consistency is produced, which is diluted after cooling with 20 grams of distilled water; 20 grams of ether are added; the whole is well shaken, and the ether taken off, out of which pyrogallic acid is obtained in fine colourless needles. In a watery solution of these crystals, alkalies and limewater produce a beautiful vermilion colouration; ferrous sulphate stains it pure blue; ferric acetate makes a blue colouration, changed to violet-red on addition of ammonia. A very short and easy way to test a gum for pyrogallol by dry distillation is the following:—The gum is placed in the lid of a cocoa-tin; the lid is covered with a watchglass or a piece of plain glass; lid and glass are held together with a spring wire. The tin lid is then heated over a candle for some minutes; the sublimated substance is washed down with some water (after cooling) from the glass plate on a little china dish, and the liquid tested with limewater and ferrous salt. Gelatine and alkaloids are precipitated by the Eucalypt tannin.

II. The phlobaphene forming the colouring matter of the soluble Eucalypt gums is precipitated by alkaloids, gelatine, acetate of lead, &c.; and by this phlobaphene some precipitates produced in the gum solution are stained pink, as they would look white without it. In very dilute gumsolutions, especially on an opal plate, it shows its proper colour as a very delicate pink, condensed in more concentrated solutions to a light and then to a darker brown. It is very similar to the colouring matter of the Malabar kino, though the latter never shows such delicate pink tints, even if diluted to the highest degree. The derivation of this colouring matter from the gum tannin and its nature as a phlobaphene is distinctly shown in forming blue precipitates with diluted ferric acetate. Limewater does not throw it out; it lightens its pink colour more, especially between the precipitated

tannate of lime. If now the ferric salt is added, the phlobaphene falls out with delicate blue colouration. Alkalies make the pink phlobaphene lighter, changing it more to vermilion, especially Na_2CO_3. Cyanide of potassium acts still in a higher degree on the colouring phlobaphene, imparting to it exactly the same colour as it does to gallic acid. This may lead to mistakes. A permanent vermilion colour, on addition of potassium cyanide to a gum solution, never indicates gallic acid, but pink phlobaphene. Dilute acids turn the pink colour of the gum phlobaphene into yellow; kino-red of the Malabar kino gets more brown.

Besides the tannic acid and the colouring phlobaphene, all Eucalypt gums which are soluble in water contain arabin or metarabin; but in this respect a wide gap divides the gums belonging to different species of Eucalyptus into two groups, as Mr. Maiden had the skill to find out first.

The gums of the first group (the "gummy group" of Mr. Maiden) are in the air-dry state insoluble in alcohol on account of the high percentage (30-40 per cent.) of arabin contained in them. (*See* under A, this page.)

The gums of the second group (the "ruby group" of Mr. Maiden) are readily soluble in alcohol, and contain not more than 6 per cent. of arabin, present sometimes as metarabin. (*See* under B, page 62.)

Some gums of both groups contain gallic acid (1·5 per cent.), but it might not be a constant constituent of them. For its determination the tannin is precipitated with antimon. tartar. and NH_4Cl. The filtrate is shaken well with ether, the ether taken off evaporated, and the gallic acid collected. As gelatine (like hide-powder) throws the gallic acid down in presence of arabin, it cannot be used in this case for the elimination of the tannin. The gallic acid can be assayed in a 10 per cent. solution of gum freed from tannin by a method I use, and based on F. Jean's method to determine tannin from the volume used up to render a solution of iron opaque. Cyanide of potassium is useless on account of the colouring phlobaphene.

A.—Gums of the Gummy Group.

The arabin contained in the gums of this group at 30-40 per cent. is not gelatinised or coagulated by ferric chloride; and is different in this respect from the arabin of *Acacia harpophylla*, *Melia composita*, *Albizzia Toona*, *Grevillea robusta*, and from the arabin contained in the gum resin of *Araucaria Bidwilli* and *A. Cunninghamii*. From the arabin of commerce as well as from that of *A. dealbata* it differs in some essential points.

Acacia arabin is suddenly and entirely thrown out of a watery solution by alcohol alone, or if only a few grains of NaCl or a few drops of HCl are added. It is not altered by the acid, and dissolves readily in water after the acidulated alcohol is poured off. Eucalypt arabin, in opposition to this, falls out suddenly by the addition of alcohol, but it gets redissolved after some standing, especially if a little HCl is added. On addition of much HCl to the alcohol it is precipitated, but its chemical composition is altered through this process; it becomes insoluble in water as metarabin. Boiling in

KOH restores its solubility. Besides this, Eucalypt arabin is so closely united to the tannin and the colouring matter of the gum that by throwing it out these substances will go down for the most part too, united with it; and only the whole Eucalypt gum, or its anhydride, is obtained by the precipitation. In the same manner (nearly) all reagents which precipitate the tannin take the arabin down also. For instance, sulphate of cinchonine precipitates the whole Siderophloia gum. Acetate of copper throws it to the bottom (if mixed in proper proportions) very suddenly, leaving the clear water in the bottle; whereas, in a mixture of Acacia arabin and tannic acid, by the action of copper acetate, only the tannin is precipitated, being kept suspended in the solution of the unaltered arabin. Gelatine unites with the whole Siderophloia gum to a mass, looking very much like unvulcanised caoutchouc, and can be drawn out in long threads until it is dried up. On addition of common salt, acetic ether takes the tannin out; and a lighter arabin might be obtained on addition of alcohol. Any quick drying of the gum, as well as repeated solving and concentrating of the gums of this group, is liable to alter them to metarabin, and to make them insoluble in water. In this manner old gums contained under the bark of the tree for many years become only soluble by boiling in a solution of alkali.

There is generally some metarabin present in the gums of this group as well as some whitish insoluble phlobaphene. The following gums have been examined, the analysis of which corroborates Mr. Maiden's previous results :—

Eucalyptus siderophloia, Benth., Fl. Austr. iii. 220. Ironbark. (See generic remarks.) The gum of this tree can be styled as the typical gum of the group. Its specific gravity is 1·380, and that of a 20 per cent. solution 1·029. It is generally found in large masses of a lighter or darker brown under the bark of the tree. It is very tough and hard.

ANALYSIS (of Siderophloia gum in the air-dry state)—

Water	18·7
Arabin	42·4
Metarabin	3·0
Phlobaphenes (and traces of ellagic acid)	2·1
Tannic acid	28·5
Gallic acid	1·5
Impurities	3·8
	100·0

E. resinifera, Sm., Fl. Austr. iii. 245. Jimmy Low. The gum of this tree agrees in most respects with that of *E. siderophloia*. It contained less tannin in my samples and more arabin. The colouring phlobaphene is a little more red-brown, showing a little less the delicate pink colour of the Siderophloia phlobaphene. It never occurs in such bulky masses as the last-mentioned gum.

ANALYSIS—

Water...	16·0
Arabin	48·4
Metarabin	2·8
Phlobaphenes	2·0
Tannic acid	26·0
Gallic acid	1·2
Impurities	3·6
	100·0

E. crebra, F. v. M., Fl. Austr. iii. 221. Narrow-leaved Ironbark. This gum contains 30 per cent. of tannin by 42 of arabin. It was not tested for gallic acid.

E. robusta, Sm., Fl. Austr. iii. 228. Swamp Mahogany Gum. Only 29·5 of tannin with 41 per cent. of arabin was found in my Queensland sample.

E. saligna, Sm., Fl. Austr. iii. 245. Grey Gum. My sample, assayed by Loewenberg's method, gave 28·4 per cent. of tannin by 42 of arabin.

B.—Gums of the Ruby Group.

The gums of this group contain about 5-6 per cent. of arabin, which is mostly present as metarabin. It settles to the bottom with the impurities. It is easily dissolved by caustic potash, and is precipitated again by alcohol or acetate of copper united to a part of the tannin.

The colouring phlobaphene agrees with that of the gummy group. Especially cyanide of potassium gives a beautiful vermilion, and ferric acetate a delicate blue colouration in very diluted gum solutions.

The tannin is identical with that of the gummy group, and with that of *Lonchocarpus Blackii* and *Millettia megasperma*.

Gallic acid was found in the gum of *E. hæmastoma* at 1·3 per cent.

Eucalyptus hæmastoma, Sm., Fl. Austr. iii. 212. Scribbly Gum.

Analysis—

Water	19·2
Metarabin with insoluble phlobaphene	7·8
Tannic acid with soluble phlobaphene	66·3
Gallic acid	1·3
Impurities	5·4
	100·0

E. acmenioides, Schau., Fl. Austr. iii. 208. Stringybark.

Analysis—

Water	20·4
Metarabic acid with insoluble phlobaphene	6·5
Tannin with soluble phlobaphene	65·5
Gallic acid	1·2
Impurities	6·4
	100·0

Similar to *Eucalyptus hæmastoma* gum are the gums of *E. pilularis*, Sm., Blackbutt (65 per cent. tannin, 5·7 metarabin); *E. tereticornis*, Sm., Bluegum (62 per cent. tannin, 7 per cent. metarabin). These gums were not examined for gallic acid.

Near to the gum of *E. acmenioides* come the gums of *E. eugenioides*, Sieb., Stringybark (tannin 65, metarabin 7 per cent.); *E. piperita*, Sm., Stringybark (66 per cent. tannin, 11 per cent. metarabin); *E. Planchoniana*, F. v. M. (68 per cent. tannin, 6·4 metarabin). These gums were not examined for gallic acid.

The percentages come as near as possible to Mr. Maiden's results in gums which are hygroscopic, and contain more or less water according to the state of the atmosphere.

NON-ASTRINGENT ARABIN GUMS.

Melia composita, Willd., Fl. Austr. i. 380. White Cedar. The gum of the white cedar dissolves entirely in water, forming a clear transparent solution, having a sour reaction, and resembling the mucilage of commercial arabic gum. It differs from the arabin of this by being coagulated from a dilute solution on addition of ferric chloride. The coagulated or gelatinised arabin is redissolved by KOH.

Lead acetate does not make any precipitate, but alcohol throws the arabin down without addition of acid or alkali, and the precipitate is redissolved in alcohol by a very small quantity of HCl. Borax does not gelatinise the watery gum solution, but silicate of soda gelatinises it by degrees.

The gum of the white cedar is a very good substitute for arabic gum.

ANALYSIS—

Water...	21·0
Arabin	79·0
	100·0

Cedrela Toona, Roxb. The gum of the red cedar contains arabin and metarabin in variable quantities. The specimen examined by Mr. Maiden contained 68 per cent. of arabin and 6 per cent. of metarabin. I always found a much higher amount of metarabin.

The arabin is gelatinised only slowly and imperfectly by ferric chloride and borax. It is precipitated out of its watery solution by alcohol, and the precipitate is redissolved by a small quantity of hydrochloric acid. The alcohol used for precipitation of the arabin acquires a greenish-yellow colour, a reaction which is very characteristic for the gum of *Cedrela Toona*. The greenish-yellow colour gets still more distinct if a little caustic potash is added. Caustic potash alone does not produce any colouration in a watery solution of the gum.

The metarabin gets dissolved in water on prolonged boiling. Alcohol precipitates the dissolved gum and acquires a greenish-yellow colour. The metarabin is also dissolved in diluted hydrochloric acid. Cold caustic potash solution dissolves only a small part of it, and on boiling the metarabin is stained brown but it gets only dissolved after a long time.

ANALYSIS—

Arabin	45·0
Metarabin	36·0
Water	19·0
	100·0

Flindersia maculosa, Lindl. (Leopardwood or Spotted-tree), and *F. Strzeleckiana*, F. v. M. (Spotted-tree). See Syn. Ql. Fl. 1st Suppl. p. 12, for bot. description. The gum of the "spotted-tree" has been analysed by Mr. Maiden (1890). It gives a colourless, sticky, sour reacting solution with water, in which a precipitate is produced by ferric chloride only if the solution is very thick. Alcohol precipitates the arabin without any addition, and this precipitate is redissolved in alcohol on addition of a small quantity of HCl. Borax

and silicate of sodium gelatinises the solution. The gum of the leopardwood is as good as commercial gum arabic for nearly all purposes.

ANALYSIS 1. (*F. maculosa*)—

Water...	18·6
Arabin	81·4
	100·0

ANALYSIS 2. (*F. Strzeleckiana*)—

Water...	16·5
Arabin	83·5
	100·0

The precipitate in alcohol wanted less HCl for solution than in the gum of *F. maculosa*, F. v. M.

Acacia dealbata, Link., Fl. Aust. ii. 415. A very good gum exudes from this beautiful tree, which found its way to the European glass houses nearly one hundred years ago.

The watery solution reacts sour to litmus, is not precipitated by sugar of lead, and ferric chloride does not stain it. It is only gelatinised in concentrated solutions by ferric chloride, borax, and silicate of soda. Alcohol precipitates the arabin without any addition of acid or alkali. HCl does not easily dissolve the precipitate in alcohol, but KOH dissolves it in the spirit, till it is thrown down again by addition of more alcohol.

The gum of the white wattle is the best substitute for arabic gum available from native Queensland trees.

ANALYSIS—

Water	19·0
Arabin	81·0
	100·0

Albizzia Toona, Bail., Syn. Ql. Flora 1st Suppl. 18. Acacia Cedar. This tree yields a gum which contains arabin and metarabin in various proportions in different samples.

The arabin, which is soluble in water, is coagulated entirely by ferric chloride, without being stained by it. The precipitate is dissolved by KOH. The arabin is not precipitated from the watery solution by alcohol or alcohol on addition of HCl, but it is thrown down quickly if KOH is added. It seems to be present in the gum as a subanhydride, which must be converted in arabin first by alkali, before it can be precipitated by alcohol. The alcohol redissolves the precipitate on neutralisation with HCl.

The metarabin, insoluble and only swelling up in water, is not dissolved by boiling, but goes into solution in cold water, if a small amount of KOH or NaOH is added. Lead acetate makes a turbidity in this solution.

Albizzia Toona metarabin is dissolved in diluted HCl on boiling, like gum tragacanth, but is precipitated out of this solution by alcohol only on addition of KOH, whereas the acidulated tragacanth solution is thrown down by alcohol alone.

ANALYSIS—

Water...	18·6
Arabin	56·4
Metarabin	25·0
	100·0

Macrozamia spiralis, Miq., Syn. Ql. Flora 1st Suppl. 49. The cones of the Macrozamias exude more or less gum from the peduncle when freshly cut. Gum also collects in the cavity of the stem, when the head of the plant is cut off. The gum has already been analysed by Mr. Maiden.

It consists of colourless, pearly, tough and hard tears, and swells very much in water, but nothing is dissolved of it, not even if the water is boiled, as neither acidulated nor alkalised alcohol makes any precipitate in it. Boiled in water with KOH or NaOH, the gum is dissolved; alcohol precipitates the arabin (or metarabic salt) from the solution.

In water with dilute HCl the gum dissolves also on boiling, and the arabin is precipitated likewise by alcohol; on addition of water it dissolves again. Ferric chloride does not coagulate or gelatinise this solution.

ANALYSIS—

Water...	20·0
Metarabin	80·0
	100·0

Hibiscus heterophyllus, Vent. The gum exuded by this tree, which is also found in New South Wales, contains true bassorin. It swells very much in cold water, forming a sticky paste like rice-meal paste, and altogether different from the granular masses formed by soaked Sterculia gum. The gum is dissolved in water on prolonged boiling. The solution does not gelatinise with ferric chloride, but the dissolved gum is precipitated by alcohol, and the precipitate is stained canary-yellow on addition of caustic potash. The gum is dissolved quickly in diluted caustic potash on boiling, whereas the Sterculia gum gives way only slowly and gradually under the same conditions.

In dilute hydrochloric acid the gum is dissolved on boiling.

These reactions indicate the identity of Hibiscus gum with gum tragacanth and its total discrepancy from the gum of the Sterculias. As the gum is found only in minute quantities it cannot be put to any practical use.

ANALYSIS—

Bassorin	78·0
Water...	22·0
	100·0

Sterculia rupestris, Benth., Fl. Austr. i. 230. The Narrow-leaved Bottletree.

St. diversifolia, G. Don., Fl. Austr. i. 229. Kurrajong.

St. quadrifida, R. Br., Fl. Austr. i. 227.

St. trichosiphon, Benth., Fl. Austr. i. 229. Broad-leaved Bottletree.

From the bark of all these bottle-trees a gum exudes of a horny texture, looking like gum tragacanth in the dry state.

It is not dissolved by water, but swells only in it, and forms white granular masses like soaked rice, with no adhesiveness.

Mr. Maiden (1889) has pointed out the similarities and dissimilarities of Sterculia gum to gum tragacanth, which yields an adhesive paste in water like that of rice meal.

The Sterculia gum is dissolved in water on boiling for some days, or on boiling in water acidulated with HCl. Alcohol precipitates the arabin from this solution. Ferric chloride does not act upon it; and the alcohol precipitate is not stained canary yellow by KOH.

By prolonged boiling in water with KOH the Sterculia gum is also dissolved, and in the solution a white precipitate is formed by alcohol.

The Sterculia gum is an inspissated vegetable slime, a higher anhydride of arabin, convertible into true arabin by hydration.

The Sterculia gum contains only 16 per cent. of water.

Terminalia catappa, Linn., Syn. Ql. Fl. 160. Indian Almond. Its Queensland habitat, Fitzroy Island. This Indo-Australian tree yields a gum which agrees in every respect with the bottle-tree gum, but in the dry state it looks more like a dark gum than like gum tragacanth. It is an inspissated vegetable slime, and contains 18 per cent. of moisture.

Castanospermum australe, A. Cunn., Fl. Austr. ii. 275. Moreton Bay Chestnut or Bean-tree. Exudes a light-brown gum from wounds in the bark, especially after the rainy season. It swells in water, and is partly dissolved in it. The watery solution is stained brown by ferric acetate, owing to a yellow vegetable dye. This colouring matter, found abundantly in the bark, is of a gamboge colour, which changes into a bright golden yellow or orange by addition of alkalies or borax. It is stained brown by ferric salts. Gelatine is not precipitated by this colouring matter, but sulphate of cinchonine is thrown down vigorously. This last precipitate is dissolved again on addition of gelatine. Limewater stains the solution of chestnut gum orange; copper acetate gives no reaction.

This vegetable dye forms only a very small proportion of the gum. Moreton Bay chestnut gum contains 15 per cent. of arabin soluble in cold water and precipitated by alcohol alone. The portion of the gum not dissolved by water gives way on addition of KOH. It consists of metarabin. Ferric chloride has no action on the dissolved arabin.

ANALYSIS—

Water...	20·2
Arabin	15·4
Metarabin	64·4
Yellow colouring matter	traces
	100·0

Bauhinia Hookeri, F. v. M., Fl. Austr. ii. 296. Queensland Ebony. A brownish yellow gum in large pieces is exuded by this tree, which is restricted to Queensland and Northern Australia. It consists mostly of metarabin, and swells only in water without being dissolved. After standing for some days in cold water a part of it is hydrated and converted in soluble arabin. This arabin solution gelatinises very slowly with ferric salts, and is not gelatinised at all by borax. The arabin is precipitated out of the watery solution by alcohol, and this precipitate is dissolved only on addition of a larger quantity of hydrochloric acid.

The metarabin is dissolved in hydrochloric acid only on boiling, and the arabin is precipitated out of this solution by alcohol without addition of an alkali.

Boiling caustic potash solution dissolves the metarabin very slowly, and without staining it much.

Sometimes a watery solution of Bauhinia gum is stained blue by ferric salts on account of some tannic acid going over from the bark into the gum after heavy rains.

The Bauhinia gum can be used like arabic gum, if soaked in water for some time. A little salicylate of soda must be added to prevent decomposition by the action of microbes.

The Bauhinia gum comes nearest to the gum of *Acacia penninervis*, Sieb.

ANALYSIS—

Arabin	12·0
Metarabin	67·0
Water	21·0
	100·0

Acacia Cunninghamii, Hook., Fl. Austr. ii. 407. Black Wattle. The arabin present in this brownish gum amounts only to 10 per cent. in my samples. Its watery solution is not disturbed by lead acetate, and not gelatinised or coagulated by ferric chloride. Alcohol precipitates the arabin. HCl dissolves it again in it. The metarabin is dissolved in boiling water, acidulated with HCl. It is dissolved also in cold water on addition of KOH. The solutions are not acted on by lead acetate or ferric chloride; but alcohol precipitates the arabin, and the precipitate is dissolved in the alcohol on addition of an excess of HCl.

ANALYSIS—

Water	17·5
Arabin	10·0
Metarabin	72·5
	100·0

Acacia decurrens, Willd., Fl. Austr. ii. 414. Green Wattle. The light-brown gum of this tree contains 18·6 per cent. of arabin soluble in water and precipitated by alcohol. Some drops of HCl prevent the reaction, and redissolve the formed precipitate in alcohol. No change takes place in the watery solution by sugar of lead or Fe_2Cl_6. The metarabin of the gum is not dissolved by boiling water, unless HCl is added, and then some of the dissolved material falls down on cooling or on addition of more water. Boiled with water and KOH, the metarabin dissolves easily to a yellow-brown mucilage; *but some metarabin separates after cooling.* Lead acetate gives no reaction. Alcohol precipitates the formed arabin from the sour and from the alkaline solution; and the precipitates are dissolved by addition of HCl to the alcohol.

ANALYSIS—

Water	19·4
Arabin	18·6
Metarabin	62·0
	100·0

Acacia penninervis, Sieb., Fl. Austr. ii. 362. My samples of this brownish gum contain 24 per cent. of arabin soluble in water. Lead acetate and ferric chloride do not act on the solution. Alcohol precipitates the arabin; a few drops of HCl prevent this reaction, and redissolve the precipitate already formed in the alcohol.

The metarabin of the gum is dissolved in boiling water, acidulated with HCl; and the formed arabin is precipitated by alcohol without being alkalised. The metarabin of the *A. penninervis* gum dissolves slowly in cold KOH solutions, but a mucilage is formed quickly on boiling. No metarabin separates after cooling. Lead acetate and ferric chloride have no action on the solution. Alcohol gives a precipitate, again dissolved on addition of HCl.

ANALYSIS—	
Water...	20·2
Arabin	24·5
Metarabin	55·3
	100·0

GUM RESINS.

Gum Resin of the Araucarias.—The resin of the Araucarias differs from the resins of the other Coniferæ. It contains arabin, as already Heckel and Schlagdenhauffen in Europe and Mr. Maiden in this country have shown. The writer has observed that the arabin of the Araucarias gelatinises with ferric chloride, and that it differs in this respect essentially from the arabin of the commercial arabic gum. Fleury (quoted by Mr. Maiden) thought the gum of *Grevillea robusta* was distinguished by the same reaction "from all other known gums." Still Fe_2Cl_6 produces gelatinisation in arabin solutions from *Melia composita*, *Albizzia Toona*, and *Acacia harpophylla*. The gelatine formed by ferric chloride with Araucaria arabin is dissolved entirely by diluted KOH; whereas the gelatine formed by Fe_2Cl_6 with Grevillea gum is insoluble in KOH even if boiled.

The cardinal point in the composition of the Araucaria resins is the inconstant percentage of their constituents. In hot and dry weather a resin is exuded from wounds in the bark containing 10 per cent. of arabin, whereas after the rainy season 60-80 per cent. may be present. The arabin is produced by retrograde metamorphosis of the cell-walls bordering on the ducts which contain the resin. The cellulose swells at first, and is then converted into arabin, which dissolves in the watery liquid of the cells; and in this solution the globules of the turpentine resin are suspended like in an emulsion, as can be seen under the microscope. These small globules unite to larger globules and drops of resin on heating.

If the Araucaria resin is boiled in water, a milk-white sediment of emulsified resin is left undissolved on the bottom, and the arabin solution covers it; turbid at first, but becoming quite clear and colourless after some days. Alcohol precipitates the arabin from the solution. Some drops of HCl prevent this reaction, alkalies favour it, but much alkali dissolves the precipitate.

The resin of the Araucaria gum resin dissolves entirely in alcohol after elimination of the arabin, and can be recovered from that by evaporation. It is a sticky resin, soluble also in ether and the essential oils, but especially in chloroform and benzol, differing by this from the resins of Agathis and Callitris. It dissolves very readily in KOH, forming a yellow soap; whereas the resin of Callitris (and Agathis) swells in KOH, and is dissolved imperfectly; H_2SO_4 has no effect on it.

A residue left undissolved in cold alcohol is taken up by boiling alcohol. It crystallises out of this on evaporation, and consists of sylvic acid.

An essential oil, resembling oil of turpentine, is present in the Araucaria resin, but different a little in that of the various species.

Araucaria Bidwillii, Hook., Fl. Austr. vi. 243. Bunya Pine. The "Holy tree" of the aborigines (*buny* means holy in some Queensland dialects) exudes a gum quite white in the fresh state, and looking like tallow from the distance. It is practically an inspissated emulsion of resin in arabin. It becomes yellow after some time, when it loses more water, as the arabin then allows the light to pass through.

The gum resin does not melt on application of heat, owing to the arabin; it becomes only charged, and emits a smell reminding of burned frankincense. By dry distillation it yields catechol (from the arabin) and phenol.

In cold water the gum resin is disintegrated, and a white sediment settles to the bottom, whereas a turbid liquid on top of it keeps a part of the arabin dissolved. The arabin, the resinous body, and the sylvic acid have already received attention. (See under generic heading.)

The essential oil can be easily distilled from the resin after elimination of the arabin. It resembles oil of turpentine, but smells a little more like the oil of *Agathis robusta* or like *Ol. Lauri.*

ANALYSES—

No. 1.		No. 2.	
Water	4·0	Water...	21·2
Arabin	12·8	Arabin	64·6
Resin	77·8	Resin	11·8
Essential oil	5·0	Essential oil	2·0
Sylvic acid	0·4	Sylvic acid	0·4
	100·0		100·0
Obtained 18th November, 1894.		Obtained 10th February, 1895.	

Both samples are from a tree in my garden.

Araucaria Cunninghamii, Ait., Fl. Austr. vi. 243. Hoop Pine. (See more under generic remarks.) The Moreton Bay pine yields a gum resin in large quantities if the bark is wounded. It has an aromatic taste and a pleasant odour, resembling that of turpentine. The gum resin was analysed by Mr. Maiden (1889), who found it to contain 10 per cent. of arabin. After the rainy season a higher percentage is the rule (38 per cent.). In gum resins poor of arabin less moisture is to be found, whereas gum resins rich in arabin contain more (12 per cent.).

The gum resins poor of arabin melt near the temperature of boiling water, but imperfectly, as they get partly charred. Catechol and phenol are between the products of dry distillation.

Boiling water disintegrates the gum resin and dissolves the arabin, which is gelatinised by ferric chloride. The resin taken up by alcohol is soluble in ether, chloroform, benzol, and petroleum spirit.

There is only a small amount of essential oil present, especially in gum resins rich in arabin. It smells more like the oil of *Agathis robusta* than of oil of turpentine.

ANALYSES—

No. 1.		No. 2.	
Water	4·3	Water...	12·0
Arabin	11·5	Arabin	38·6
Resin	81·8	Resin	48·2
Volatile oil	2·2	Volatile oil	1·0
Sylvic acid	0·2	Sylvic acid	0·2
	100·0		100·0
Obtained 15th November, 1894.		Obtained 20th February, 1895.	

Grevillea robusta, A. Cunn., Fl. Austr. v. 459. Silky Oak. From the bark of this beautiful shade tree a gum resin or gum exudes in long tears, sometimes light-brown, and quite pellucide, sometimes yellowish and opalescent. It is quite insoluble in alcohol, ether, chloroform, benzol, and petroleum ether. Sometimes it is tasteless, sometimes it has a bitter unpleasant taste. The clear pieces are quite soluble in water, and form a sticky gum, which is only slightly opalescent; the darker and yellowish untransparent pieces are only partly soluble in water, and form in concentrated solutions a pinkish-white milky paste, which, when diluted with more water, is turned into a whitish opalescent emulsion. Under the microscope (500) minute globules of an undissolved body (resin) are seen swimming in a clear solution of the gum. Addition of caustic potash renders the opaque solution instantly clear. The microscope then shows that the resin globules have been dissolved.

The whitish paste formed by a thick watery gum solution, if spread on an opal plate, changes its colour to a beautiful violet on addition of caustic potash (after standing a while). By this reaction *Grevillea robusta* gum is easily recognised. Borax gelatinises the solution of the gum, and silicate of soda does the same.

The bulk of the gum resin consists always of a kind of arabin or arabin salt, in which, according to the season and to the dry or wet state of the atmosphere, a larger or smaller amount of a resin in form of minute globules (smaller than those of the Araucaria resin) is suspended. The arabin is obtained pure by precipitation with alcohol from the watery solution. Redissolved in water, it differs from the watery solution of arabic gum by being gelatinised on addition of ferric chloride or ferric acetate. Sometimes this reaction takes place only after the gum solution has been made alkaline by soda or caustic potash. The arabins from *Araucaria Cunninghamii*, *A. Bidwillii*, as well as from the commercial arabic gum and from *Acacia harpophylla*, *Melia composita*, and *Albizza Toona*, are gelatinised by ferric chloride in the acid state, and the ferric gelatine is dissolved by alkalies. In opposition to this a solution of *Grevillea robusta* gum is gelatinised by ferric salts only in the alkaline state, and the ferric gum compound is dissolved by vegetable and mineral acids, but not by caustic potash, not even on boiling. Alcohol precipitates the gummy part of the gum-resin solution. Dilute hydrochloric acid prevents, alkali favours, the precipitation. The purified gum does not give a violet reaction with caustic potash. Strong solution of borax makes the watery solution of the purified gum very stiff and sticky.

The resinous part of the gum resin is obtained on evaporation of the alcohol, by which the arabin has been precipitated. It is of a reddish-brown colour, and melts at about 70° C. It is soluble in alcohol, ether, chloroform, and oil of eucalypt, but not in benzol.

The solution in alcohol is reddish-brown. It is altered to greyish-green by ferric chloride, and then to pink on addition of ammonia. Caustic potash stains the alcoholic solution first brown and then beautifully violet, which colour, on addition of hydrochloric acid, is changed into yellow. These reactions give evidence of the identity of the resin contained in the resinous gum of *Grevillea robusta* with the resin exuded pure by *Grevillea striata*, and described fully on page 50. The substance which causes the bitter taste of the gum resin can be

taken out of the watery solution by ether. It crystallises in groups of needles, which are insoluble in water, alcohol, benzol, and acetic acid, and which dissolve easily in ether, chloroform, and acetic ether after some time.

ANALYSIS—

Water...	19·4
Grevillea resin	8·6
Grevillea arabin	71·7
Bitter crystals from ether...	0·3
	100·0

The Grevillea gum resin can be used like arabic gum for all ordinary purposes.

TAN-RESIN GUMS.

ASTRINGENT GUMS CONTAINING A TAN RESIN OR ELLAGIC ACID AND A TAN RESIN.

This section comprises the Eucalyptus and Angophora gums, which are partly insoluble in water. They form Mr. Maiden's "turbid group"—are of the highest interest for, and present the greatest difficulties to, the analytical chemist. They vary much, and an apparently essential constituent of a sample from one species might be absent altogether in another sample, even derived from the same tree at a different time; hence the wide discrepancy in the statements of different analysts. The percentage varies altogether.

The tan-resin gums of the Myrtaceæ are entirely endemic in Australia, as no plant of another country yields an exudation similar to them in chemical composition.

The tan-resin gums all agree with each other in some essential respects.

1. They all contain tannins stained delicately blue by ferric salt in a dilute solution. These tannins have nothing to do with kinotannic acid, as they yield pyrogallol by dry distillation.*

2. That part of the tan-resin gum which is insoluble in water does not contain any catechin,* as it yields pyrogallol by dry distillation, and as no part of it gives a green reaction with ferric salt. In some tan-resin gums a large proportion of the part which is insoluble in water is also insoluble in alcohol.

Angophora lanceolata, Cav., Fl. Austr. iii. 184. Rusty Gum. This tree contains no volatile oil in the foliage. It has a smooth bark, and exudes a tan-resin gum, which is liquified by rains and run into brittle red streaks.

When dissolved in water it leaves a whitish, insolvent, powdery deposit. It dissolves to a great extent in hot water, but the solution always looks turbid at first. A pinky-white precipitate occupies the whole volume of the liquid (65 per cent. soluble, 35 per cent. sediment).

This tan-resin gum is partly soluble in cold water; and out of the clear solution, after some standing, a white powder is deposited, insoluble in alcohol, ether, and acetic ether.

* This was pointed out first by the writer in a paper read at Brisbane before the A. Assoc. for Adv. of Science in January, 1895.

Under the microscope (800 enlarg.) this deposit is seen to consist of a granular mass, which dissolves in caustic potash with intense yellow colour. After a minute, groups of radiating needles (3 μ) of potassium glaucomelanate are formed, and single needles are seen to grow rapidly in the yellow solution. Fuming nitric acid dissolves the powder with intense crimson colouration, and sulphuric acid makes a yellow solution on addition of water. In hot alcohol the powder dissolves, and fine needles (2 μ) of crystallised *ellagic acid* are formed by evaporating the hot solution. In chloroform the powdery deposit dissolves, and on evaporation long crystalline needles of ellagic acid and round globules of a resin are left.

In cold alcohol the *A. lanceolata* tan-resin gum seems at first to be entirely soluble, but after a short time a whitish deposit resembling arabin is deposited, which, when tested, proves to be nothing else but ellagic acid, amounting to 8·1 per cent. of the tan-resin gum. A residue of metarabin (9·4 per cent.) settles, with bark and impurities, 5·3 per cent.

In finding so much ellagic acid, we are induced to look for—

1. *Ellagitannic acid* as the mother substance, and to compare the reactions of the tan-resin gum solution with those of myrobalans and divi-divi, which hitherto were thought to be the richest source of ellagic acid. Now, copper acetate makes a light-brown precipitate (in *Angoph. lanc. sol.*), not so light as with myrobalans, but much lighter than with gallotannic acid. Copper sulphate makes a slight green precipitate, like myrobalans, and on addition of ammonia a light-brown precipitate is formed. Limewater makes a yellow precipitate turning purple (like myrobalans). Ammon. molybdate in nitric acid produces a dirty yellow or dark-greenish precipitate like divi-divi. These reactions show decidedly that the tan-resin gum of *A. lanceolata* contains a tannate most allied to that of myrobalans and divi-divi. A watery solution of the tan-resin gum, when filtered off from the first deposit of ellagic acid, continues to make fresh deposits of this, until nearly all ellagitannic acid is exhausted, and only the phlobaphene-yielding tannin is left, so that an old watery solution is stained only pink by KOH.

On addition of HCl to a fresh watery solution of *A. lanceolata* tan-resin gum the ellagitannic acid is precipitated first, mixed with a small amount of the phlobaphene-yielding tannin to be mentioned later on. Separated, re-dissolved in water, and boiled with dilute HCl, it yields ellagic acid insoluble in spirits and dissolved by KOH with intense yellow colouration.*

2. After elimination of the ellagitannic acid *another tannin* is left in the watery tan-resin gum solution, which has darker reactions, and which is stained pink by KOH. It comes nearest to the tannin of the oak bark, and differs from that of the Eucalypt gums of the gummy and ruby groups by yielding a red-brown dense phlobaphene, to be called Angophora red. This phlobaphene dissolves in alcohol with red-brown colour; the solution in KOH is pink.

In the precipitate caused by HCl in the fresh watery solution of *Angophora lanceolata* tan-resin gum, the ellagitannic acid and the tannin which yields Angophora red are always more or less mixed

* The precipitate formed by boiling in dilute HCl must be freed from Angophora red by washing with alcohol.

together and bound to a skeleton of *metarabin*. KOH dissolves the precipitate with deep-brown colouration, owing to the tannin which yields Angophora red. Water and alcohol dissolve the precipitate at first, but after some time, or if boiled in the water-bath, a part of it gets insoluble. KOH dissolves this part with intense yellow colouration (ellagic acid and metarabin); benzol extracts a small amount of a *resin* out of it, deposited in globules on the watchglass after evaporation of the solvent, and leaves a skeleton of metarabin, which is dissolved in KOH together with the ellagic acid. Chloroform extracts the ellagic acid out of the insoluble part of the precipitate (in company with the resin), and deposits it when evaporating in form of needles and bushy groups of crystals, insoluble in cold alcohol and water and dissolved in KOH.

As mentioned above, the tan-resin gum of *Angophora lanceolata* is soluble in boiling water to the amount of 65 per cent. A residue of 35 per cent. is left undissolved. Out of this residue alcohol takes 12·2 per cent. up, consisting of 5 per cent. of a resin, which keeps 7·2 per cent. of the tannins embodied in its substance. On addition of the alcohol the tannins keep dissolved in the water, but the resin is eliminated in form of minute microsopical globules suspended in and giving an opalescent appearance to the liquid. These globules never go to the top or to the bottom of the liquid, which retains its opalescent appearance for years. It brightens up quickly if KOH is added. Chloroform takes the resin out of the watery liquid. It dissolves in KOH with yellow colouration, and is stained blue and black by ferric acetate. It is a tan resin derived from one of the tannins or from ellagic acid. Similar tan resins have been described by Heckel and Schlagdenhauffen. (See Pharm. Journal, 92-93.)

The residue left undissolved by alcohol consists of 8·1 per cent. of ellagic acid, 9·4 per cent. of metarabin, and 5·3 per cent. of impurities. A small amount of a volatile oil is present in the tan-resin gum of *Angophora lanceolata*. From a watery solution it can be distilled over. It has a smell reminding one of Ol. Chamomillæ from *Matricaria Chamomilla, L.*

Analysis (22nd Feb., 1895)—

Water	19·3
Ellagitannic acid	12·4
Tannin yielding Angophora red...	33·3
Ellagic acid	8·1
Metarabin	9·4
Resin	5·0
Tannin embodied in the resin	7·2
Impurities	5·0
Volatile oil	traces
	99·7

This analysis differs a little from another one made in September, 1894, from an exudation of the same tree, which yielded the tan-resin gum of this year.

Similar exudations are produced by *Angophora subvelutina*, F. v. M., Fl. Austr. iii. 184 (Apple-tree); *Angophora intermedia*, DC., Fl. Austr. iii. 184 (Apple-tree); *Angophora Woodsiana*, Bail., Syn. Ql. Flora, 172 (Apple-tree); but another colouring phlobaphene is present in them.

Eucalyptus corymbosa, Sm., Fl. Austr. iii. 256. Bloodwood. This tree, the foliage of which does not contain any volatile oil, yields a tan-resin gum in large quantities, exuding at times a bright-red fluid of the consistence of treacle. It often becomes imprisoned between the layers of wood, where it gets hard, and may be broken out in quantity. It varies from being soluble in water to complete insolubility in water and alcohol.

Fresh tan-resin gum is dissolved partly in cold water, and out of the clear solution a greyish powder is deposited after some time, insoluble in alcohol and water. It looks exactly like the same deposit from *Angophora lanceolata*, only it has a bluish colour from the *corymbosa phlobaphene*. In KOH it dissolves with intense yellow colouration, and at the same time the crystals of glaucomelanate of potassium appear under the microscope. Hot alcohol and chloroform dissolve the powder partly; a skeleton of metarabin is left, which gives way to KOH at least on boiling. On evaporation crystalline needles of *ellagic acid* separate from the chloroform and the alcohol Still there is not so much of this contained in the exudation of *E. corymbosa* as in that of *Angophora lanceolata;* and no further deposit of it is formed after the first one is filtered off. Addition of HCl to a 10 per cent. solution of *E. corymbosa* tan-resin gum in cold water brings down a yellow precipitate of *ellagitannic* acid and *corymbosa tannin* together with [met] *arabin*, which forms the bulk of the precipitate. This precipitate is soluble at first in water, but soon gets insoluble in it. Chloroform then takes ellagic acid out of it, which crystallises in the form of fine needles on evaporation.

If boiled, the bulky mass of the precipitate collapses a little. Alcohol then takes the phlobaphene (from the corymbosa tannin) out; metarabin and ellagic acid are left. Cold KOH takes the ellagic acid out of the metarabin, which dissolves when boiled in KOH.

There is a bright blood-red colouring phlobaphene present in the tan-resin gum of *E. corymbosa*, which shows the following reactions:— Ferric chloride or acetate, light-blue, turned in Indian red on addition of ammonia. KOH, greenish-brown. Cyanide of potassium, brown. Na_2CO_3, greenish-brown. Copper acetate, greenish-brown. Ferricyanide of potassium in ammonia, brown. Limewater, greenish-brown. Ammon. molybdate in HNO_3, dark-brown and greenish. Sulphide soda, green. Lead nitrate, greenish-brown precipitate.

After elimination of this phlobaphene, the tannins (precipitated by HCl and quickly redissolved in water) do not show so much green in the reactions. As the ellagitannic acid is precipitated first, it can be eliminated, too, for the greater part; and then the corymbosa tannin gives reactions similar to those of the gums belonging to the gummy and the ruby groups.

The phlobaphene produced from corymbosa tan-resin gum by boiling in dilute HCl looks darker than that of *Angophora lanceolata.*

There is a changeable amount of residue left undissolved in water, depending on the presence of arabin or metarabin and of insoluble phlobaphene in the exudation. The insoluble part amounts sometimes to 45·0 per cent.; sometimes there is only 25·0 per cent. of it present, or even less. Out of this residue alcohol dissolves a resinous matter holding some tannin embodied in its substance. The tannin goes in

solution if water is added; the resin is eliminated, taken up by chloroform and dissolved by KOH. The ellagic acid is dissolved by chloroform or hot alcohol; the metarabin by boiling KOH.

Analysis (5th April, 1895)—

Water...	18·0
Ellagitannic acid ... ... } Tannin, yielding corymbosa red }	37·0
Ellagic acid	5·6
Metarabin and arabin	8·3
Phlobaphene soluble in alcohol	10·0
Resin	8·6
Tannin embodied in the resin	7·2
Impurities	5·0
	99·7

Eucalyptus maculata, Hook., Fl. Aust. iii. 258. Spotted Gum. This tree has a deciduous bark, and where it is wounded throws out a brown treacle-like tan-resin gum, which hardens into large masses. When these are disturbed they give off an aroma like benzoin. During rain the gum softens and whitens; when dry, the colour again becomes brown. The dry gum is very porous and brittle.

In cold water a small amount of the gum is dissolved, with a yellow colour like white wine. This solution reacts as follows:—Ferric acetate makes a beautiful blue precipitate, turning brown on addition of ammonia. KOH gives a yellow colouration on an opal plate, turning blood-red inside, greenish outside. Cupric acetate, light-brown precipitate. Cupric sulphate, light-brown precipitate, getting darker on addition of ammonium carbonate. Limewater, yellowish precipitate, turning purple-brown. Sulphide sodium gives a deep yellow colouration. Lead nitrate, yellow precipitate. Uranium acetate, red-brown mixture. Ammonium molybdate in nitric acid, yellow colouration. Antimon. tartar. gives a precipitate only on addition of NH_4Cl. Gelatine, albumen, and sulphate of cinchonine are precipitated. Boiled with HCl (dilute), a red phlobaphene is produced. Dry distillation yields pyrogallol.

If an old watery solution be boiled with dilute HCl, it deposits a precipitate, which on addition of alcohol is only partly dissolved. The soluble part (phlobaphene) is stained beautifully pink by KOH. The grey insoluble part consists of ellagic acid, and dissolves with bright yellow colouration in KOH.

That part of the gum which is not dissolved in cold water dissolves partly in alcohol. A remnant (of 24 per cent. of the tan-resin gum) is left undissolved. It consists of ellagic acid and metarabin. The ellagic acid is dissolved in cold, the metarabin in hot, KOH. The alcoholic solution contains:—(1) Tannates which were enclosed in the tan resin to be mentioned and phlobaphene; (2) benzoic acid; (3) a tan resin. If the alcoholic solution is evaporated to dryness, and the residue is heated under a watchglass, beautiful rhombic plates are sublimated, which when heated melt to globular drops, each of them getting reconverted in a crystal after cooling. They dissolve in alcohol and slightly alkaline water, have the pungent taste of benzoic acid, and the irritating smell of this substance when heated. Ferric salt produces in the solution a reddish-yellow precipitate, showing them to consist of benzoic acid.

The resin was thought by Mr. Staiger to be identical with shellac, to which it bears much resemblance, being insoluble in benzol, but it has nothing to do with shellac at all. It softens very much in water; and really a part of it, consisting of tannin, is redissolved and stained blue by ferric salts and pink by KOH. It dissolves freely in ether, where the Alpha and Beta resin of shellac are quite insoluble. It dissolves in acetic ether which does not affect shellac. Finally, it is dissolved by weak KOH with deep yellow colouration, and under the microscope radiating crystal groups of glaucomelanate of potassium are seen to be formed.

The alkaline solution is stained blue-black by ferric salt after neutralisation with HCl. This shows plainly that the substance in question must be recognised as a resinous body derived from a tannate and as a relation of ellagic acid, as similar tan resins have been shown by Schlagdenhauffen (1891). Dry distillation yields pyrogallol.

Analysis (15th April, 1895)—

Water		12·0
Ellagitannic acid (not always present) Tannin, yielding phlobaphene	...	18·4
Ellagic acid		13·8
Arabin and metarabin		10·2
Tan resin		21·0
Tannin bound up in tan resin...		12·8
Phlobaphene		7·0
Benzoic acid		4·3
Aromatic substance (styrol ?)		traces
		99·5

Eucalyptus microcorys, F. v. M., Fl. Austr. iii. 212. Tallow-wood. Yields an exudation very rich in tannin. It is soluble in water to a large extent. The decoction looks turbid, and deposits a flocculent sediment amounting to 12 per cent. of the gum.

After elimination of the insoluble part, the clear solution gives the following reactions:—Ferric acetate, blue precipitate turned purple by ammonia. Ferricyanide of potassium in ammonia, violet-brown or vermilion, turned in brown on standing. KOH, NaOH, and Na_2S produce a greenish-yellow colouration on an opal plate, turning pink inside. Limewater makes a greenish precipitate; potassium cyanide, a yellow-brown colouration. Ammon. molybd. in HNO_3 produces a dark-brown, cupric acetate a light-brown, precipitate, which turns yellow-brown or greenish-brown on addition of ammonium carbonate. Antimon. tartar. makes no precipitate unless NH_4Cl is added, which produces a yellow-brown precipitate. That of the lead salts is greenish-yellow. Gelatine, albumen, and sulphate of cinchonine are vigorously precipitated.

These reactions are exactly the same as are produced in the solution of the tan-resin gum of *Eucalyptus tessellaris*, F. v. M.

The residue left undissolved in water is partly soluble in alcohol, which takes up the resin, the tannin embodied in it, and the phlobaphene. The part insoluble in alcohol is redissolved partly in water (metarabin, changed again in arabin) after it has been washed alternately in water and alcohol. The rest consists of ellagic acid in a skeleton of metarabin. The ellagic acid is dissolved in cold, the metarabin in boiling, KOH. No crystals of glaucomelanate of potassium

could be observed in the bright-yellow solution. The part soluble in alcohol is eliminated on addition of water. The resin is taken out of this by chloroform, and deposited as globules on the watchglass after evaporation. No crystals could be observed. The resin dissolves with bright-yellow colouration in KOH. The water (mixed with alcohol) out of which the resin was taken by chloroform is remarkable for the deep crimson colouration which it gets on addition of ferricyanide of potassium in ammonia. This colouration is due to the phlobaphene.

By boiling a watery solution of *E. microcorys* gum with dilute HCl only phlobaphene is obtained, and no trace of ellagic acid.

Dry distillation of the residue left undissolved in water yields pyrogallol.

ANALYSIS (15th January, 1895)—

Water	20·0
Tannin	62·5
Arabin and metarabin	7·4
Phlobaphene	1·2
Ellagic acid	2·0
Tan resin	6·4
	99·5

Eucalyptus tessellaris, F. v. M., Fl. Austr. iii. 251. Moreton Bay Ash. On the upper part of the tree the bark is deciduous, on the stem it remains in quadrangular pieces; hence the name. The exudation differs from all other Eucalypt exudations on account of the low melting point (30° C.) of the tan resin; it runs from the tree the colour of dark-brown treacle without any tint of redness, passing on to black. Exposed to air it becomes hardened.

The dry tan-resin gum is reddish-looking, bright, and shining. Water dissolves 70 per cent. of it, including the tannin, which is present at 52·3 per cent. It shows exactly the same reactions as the tannin of *E. microcorys* (see p. 76). The residue left undissolved in water consists for the most part of a tan resin, which under water is not sticky to the fingers. Still it can be drawn out in short threads. It has a pungent taste. On exposure to air it hardens at a temperature under 20° C., but it gets soft over 20° C., and is very sticky at 35° C. It is scarcely dissolved by chloroform, and ether acts slowly on it. Alcohol dissolves it with a brown colouration, owing to the phlobaphene contained in it. Before the elimination of the phlobaphene, KOH stains the alcoholic solution brown, as the tan resin itself then is dissolved in strong alkalies with brown colouration. If water is added to the alcoholic solution, a turbidity results. Ether takes the phlobaphene and the tannin out of the turbid liquid; the resin is recovered by concentration, addition of absolute alcohol, and evaporation. The phlobaphene is dissolved by KOH with pink, the resin with intense yellow colouration. The resin has nothing to do with shellac.

ANALYSIS (8th April, 1895)—

Water	18·5
Tannin	52·3
Arabin and metarabin	5·5
Tan resin	20·5
Phlobaphene and tannin embodied in the resin	3·0
	99·8

Benzoic acid might be present in some exudations, but none was found by me.

Eucalyptus Stuartiana, F. v. M., Fl. Austr. iii. 243 (Stanthorpe Box); **E. goniocalyx*, F. v. M.; and **E. viminalis*, Labill., yield exudations, which agree entirely in all three species. They are soluble in water to the amount of 54 per cent., including 35 per cent. of tannin. The solutions show the following reactions, mostly due to a beautiful pink phlobaphene, especially to be noticed on an opal plate in very dilute solutions:—Ferric acetate, blue; this colour is masked sometimes by the pink phlobaphene, and looks green at first; addition of ammonia, purple. KOH, pink-brown or vermilion colouration. Pot. cyanide. pink solution. Limewater, pink precipitate. Na_2S, pink solution. Ammon. molybdate in HNO_3, yellow-brown precipitate. Ferricyanide of potass. in ammonia, vermilion colouration. Lead salts, pink precipitate. Cupric acetate, light-brown precipitate, turning to pink-brown on addition of ammon. carbonate. Antimon. tartar., no precipitate; addition of NH_4Cl, white precipitate. The solution precipitates gelatine and sulphate of cinchonine.

The residue left undissolved in water amounts to 46 per cent. The chief part of it is a tan resin which holds a phlobaphene and some tannin embodied. The phlobaphene dissolves in KOH with magnificent pink; the tan resin with bright-yellow colouration.

No analysis was made of these gums.

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* These two are not Queensland species.

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1 & 2 Asplenium simplicifrons var lacinatum

Plate 12

Photo-lith. in the Surveyor General's Office Brisbane by W.H. Greenfield

½ Nat size

Polypodium irioides var lobatum.

Plate III

Acacia georginæ, Bail

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BOTANY BULLETIN No. XIV.

OCTOBER, 1896.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

BY AUTHORITY: EDMUND GREGORY, GOVERNMENT PRINTER, WILLIAM STREET.

1896.

PREFATORY REMARKS.

I take the opportunity here afforded of thanking my numerous correspondents for their kindness in continuing to send me specimens of the indigenous plants. As may be expected, many of these prove only old well-known species, and so will not be found recorded in these publications ; such specimens, however, come in for purposes of exchange with foreign parts, and therefore have a value. From parts which have been but casually or not at all collected over is where new species may be looked for, and it is particularly from such localities that I would solicit specimens. It must be borne in mind that, meeting with fresh species, much depends upon the time of year, and also the weather ; one collector may pass over a locality and find nothing worth collecting, whereas another person going over the same ground a month or so later, or after a fall of rain, may find it rich in rare or new species. I would again remind collectors that shoots bearing leaves alone are useless for determination ; all specimens sent to a botanist should bear flower or fruit—both if possible. I am also anxious to receive, whenever such are obtainable, the local or native names, and also information upon the known or recorded medicines or other virtues the plants are supposed to possess.

Just as this Bulletin was ready for press, we received news of the death of Baron von Mueller, whose name is so indelibly engraved upon every page of the Australian flora that it forms a monument to his memory more lasting than stone. As, probably, his oldest Australian friend, I need only say that I join with all fellow-workers in expressing deep sorrow for his rather sudden death, which happened on Saturday, 10th October, 1896.

F.M.B.

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EXPLANATION OF PLATES.

I.—Portion of branch of *Dysoxylum cerebriforme*, Bail.

II.—Fig. 1. Fruit of *Dysoxylum cerebriforme*. Natural size.

Fig. 2. After upper part of capsule has been removed.

Fig. 3. After upper part of capsule has been removed, another view.

Fig. 4. After lower part of capsule has been removed.

Fig. 5. Form of seeds when two in a cell.

Fig. 6. Form of seed when one in a cell.

III.—*Liparis Nugentæ*, Bail. Fig. A, flower enlarged.

IV.—*Goodyera ochroleuca*, Bail.

Fig. A, flower enlarged. Fig. B, labellum.

V., VI.—Forked fronds of *Asplenium nidus*, Linn.

BOTANY:
CONTRIBUTIONS TO QUEENSLAND FLORA.

Order RUTACEÆ.

Tribe ZANTHOXYLEÆ.

EVODIA, Forst.

E. littoralis, *Endl.* An erect tree, glabrous except for a slight pubescence on the young growth and inflorescence, about 50 ft., with a light-coloured bark, the branchlets very stout, terete, but bluntly 4-angled at the ends where the leaves and flowers are borne. Leaves somewhat crowded towards the end of the branchlets, digitately 3-foliolate, on petioles 2 to 2½ in. long; leaflets oblong, lateral ones oblique at the base, the middle one sometimes tapering into a petiolule, all obtusely acuminate, 5 or 6 in. long, and 1½ to 2 in. broad, texture thick, deep-green, and somewhat glossy. Flowers small white in trichotomous panicles, the flowers borne in clusters of 3, 4, or more at the ends of the branchlets of the panicle. Sepals 4 minute. Petals 4 oblong 1 line long, with reflexed tips, the base or very short claw woolly at the sides, stamens 4; filaments subulate, slightly hairy at base. Anthers ovate-oblong, light-coloured. Disk prominent, annular. Ovary deeply 4-lobed, glabrous; style short, thick. Fruit as yet not obtained.

Hab.: Eumundi, *Field Nat. Excursion*, Nov., 1895. The above is, I believe, identical with the Norfolk Island tree described by Steph. Endlicher, and I think this the first time the tree has been met with in Australia since collected by Allan Cunningham near the Brisbane River in 1829. One of these specimens now in my possession has lost its flowers, and the leaflets are somewhat larger than those gathered at Eumundi.

ACRONYCHIA, Forst.

A. lævis, *Forst.*, **var. normalis.** Fruit hardly showing angles, leaves scarcely glossy, and smaller than in other forms.

Hab.: Mountain scrubs and creek sides, Southern Queensland.

A. l., var. purpurea. Fruit axillary of a purplish or plum colour, leathery, with very prominent angles, very hollow; tree small, with a dark-green foliage.

Hab.: Creek sides, in Southern Queensland.

A. l., var. leucocarpa. Fruit white, somewhat fleshy, with obtuse angles, borne in lateral cymes; leaves bright glossy-green, about 4 in. long, and 1 to 1½ in. wide, often forming a tall tree.

Hab.: Eumundi.

Order MELIACEÆ.

DYSOXYLUM, Blume.

D. cerebriforme (sp. nov.) (Pericarp crinkled, resembling the brain.) A small tree, leaves on the fruiting branchlets, 6 to 9 in. long, more or less hirsute, impari-pinnate, leaflets 7 to 9, 1½ to 3½ in.

long, 1½ in. at the widest part, those near the end of leaf lanceolate, the lowermost ones abruptly rounded at the base, points elongated, petiolules very short. (On a leaf sent separate from the fruit-bearing specimen the petiole and rhachis measured 1 ft. long, and the leaflets were of the same form but measured 8½ in. long and 3 in. wide.) The young growth shows a ferruginous pubescence, but the older leaves are hirsute with white hairs, some of which are much longer than the others. Flowers not seen. Fruit on short racemes or panicles near the summit of the branchlets, pyriform-globose, 1½ in. long, 1¼ in. in diameter, 5-celled, 5-seeded; in some fruits one or more of the cells 2-seeded; seeds attached near the base, testa orange-madder coloured, bluntly 3-sided, the arillus only covering a third of the seed. Pericarp prominently wrinkled, covered with a dense coating of short orange-coloured hairs besides the longer white ones with which other parts of the plant are sprinkled. (Plates I. and II.)

Hab.: Freshwater Creek, near Cairns, *L. J. Nugent.* The only other Australian species that I know of with a deeply wrinkled pericarp is one of which I gathered fruiting specimens on the Mulgrave River in 1889; this had the 5-celled fruit and the very oblique base to the leaflets of *D. rufum*, Benth. Thus I placed my specimens under that species, but now I am inclined to think it may prove a distinct species or variety.

Order RHAMNEÆ.

POMADERRIS, Cahill.

P. ferruginea, *Sieb.* Of this species Bentham says, at page 417, vol. I., Flora Austr.:—Very near *P. elliptica*, and united with it by F. Mueller, having the leaves glabrous above, and the small flower of that species, but the leaves are usually rather longer for their breadth and more acute, and the down of the under side is much more dense, velvety, and usually ferruginous. The flowers are more numerous, the calyx more softly and densely hairy, and the petals usually narrower. The fruits are the same.

P. f., var. canescens. Leaves 3 to 4 in. long, white, and less ferruginous underneath. Intermediate almost between *P. ferruginea* and *P. elliptica*. Percy Island. A. Cunningham. *Benth. l.c.* Of this I have no authentic specimens, but from specimens just received from Mr. F. C. Simmonds it would seem that the variety is growing on Taylor's Range. This plant forms a shrub 5 or 6 ft. high. Branchlets softly velvety, with light or dark brownish longer hairs. Leaves ovate-lanceolate, 2½ to 4½ in. long, 1 to 1½ in. broad, rather obtuse, apiculate, on petioles of about ½ in., margins entire, glabrous above, the under side densely clothed with a nearly white tomentum and longish scattered brownish hairs. Panicles corymbose, terminal and in the upper axils. Stipules hairy outside, glabrous and purplish-brown inside, ovate-lanceolate 3 lines long, frequently toothed. Bracts scarious almost orbicular, margins ciliate. Flowers minute, with pedicels not exceeding 2 lines. Calyx with long hairs outside, glabrous, and satin-white inside. Petals very fugacious, shorter than the calyx-lobes, white, spathulate, toothed on the margins, serrulate at the end; filaments glabrous, anthers slightly exserted, style-branches with broad, sometimes almost didymous stigmas.

Order SAPINDACEÆ.

RATONIA, DC.

R. Nugentii (n. sp.) (After L. J. Nugent, from whom I have received specimens of many interesting Queensland plants.) A small tree, branchlets dark-coloured and angular. Leaves with from 4 to 6 distant leaflets, petioles 3 or 4 in. long, angular and swollen where they join the stem, rhachis slightly longer than the petiole; leaflets ovate-lanceolate, 5 to 9 in. long, 2 to $3\frac{3}{4}$ in. broad, base cuneate, apex abruptly acuminate, texture membranous, margins entire, petiolules short, swollen where they join the rhachis. Panicles in the upper axils, slender on very short peduncles, 2 or 3 of the lower branches 4 or 5 in. long, the others much shorter, flowers pedicellate in scanty clusters. Bracts minute, hairy. Pedicels about 2 lines long, slender. Calyx 5-lobed, the lobes slightly hairy, and almost triangular $\frac{3}{4}$ line. Petals 5, tomentose twice the size of the calyx-lobes, very broad, truncate, emarginate or toothed at the end, and tapering to the base, marked on the back with 3 lines, scale on face large, very woolly, bearing near the end on the back prominent orange-coloured glands. Stamens about 8, filaments hairy, twice as long as the petals; anthers glabrous. Ovary hairy, 3-angular. Capsule 1 in. diam. on a thick stipe, 3-celled and sharply keeled at the sutures, pericarp thick, succulent, yellow, glabrous, seeds 1 in each cell, testa chestnut coloured, bearing at the base a yellow cordate strophiole about $3\frac{1}{2}$ lines broad.

Hab.: Freshwater Creek, Cairns, *E. Cowley and L. J. Nugent.*

NEPHELIUM, Linn.

N. Lautererianum, *Bail.* Flowers minute in slender, widely branching panicles near the summit of the branchlets, inserted shortly above the axils, or angle formed by the leaf and the branch, panicle branches spike-like, bearing short branchlets which produce at their extremities clusters of from 2 to 4, or at times solitary flowers, which when expanded scarcely exceed 1 line in breadth. Calyx of 5 ovate lobes. Petals white, larger than the calyx lobes, angular toothed, scales ciliate. Disk lobed. Stamens 8, filaments hairy, anthers glabrous.

The inflorescence of this superb tree was unknown until Mr. J. H. Simmonds collected at Eumundi in May last the specimens from which the above description has been drawn up.

Order LEGUMINOSÆ.

Tribe PODALYRIEÆ.

PULTENÆA, Sm.

P. parviflora, *Sieb.* Flora Austr. (Flowers small). Branches numerous, slender, pubescent, with greyish appressed hairs; leaves oblong-cuneate, obtuse, 1 to 2 or rarely 3 lines long, concave, or with incurved margins, darker-coloured underneath with a slender midrib, glabrous or sprinkled with a few hairs when young; stipules appressed. Flowers few, small, in the upper axils; bracteoles inserted on the calyx-tube near its base, linear-subulate, ciliate, 2-stipulate. Calyx about 2 lines long; lobes acuminate, longer than the tube, the two

upper ones broad, falcate, and united at the base; ovary hairy at the top; style dilated downwards.—*Benth. l.c.* The Queensland form has longer, more hairy leaves.

Hab.: Caloundra, *J. Wilson.*

Tribe GALEGEÆ.

GLYCYRRHIZA, Linn.

(So named from the sweetness of the roots of some species.) Calyx-lobes equal, or the two upper ones shorter and more united; petals narrow; standard ovate or oblong, nearly sessile; keel shorter, obtuse, or almost acute, the petals scarcely cohering. Upper stamen free or slightly cohering with the others in an open sheath; anther-cells confluent at the top, the alternate smaller anthers opening in two unequal valves. Ovary sessile, with two or more ovules; style incurved, glabrous, with a terminal stigma. Pod ovate, oblong, or shortly linear, flattened or turged, glandular muricate or rarely smooth, indehiscent or opening tardily in two valves. Seeds not strophiolate; herbs with the root often sweet. Leaves unequally pinnate, or rarely 3-foliolate, without stipellæ. Stipules narrow, membranous, deciduous. Flowers blue, violet, white, or yellowish, sessile or very shortly pedicellate, in axillary racemes. Bracts narrow; very deciduous. Bracteoles none.—Fl. Austr. II., 224.

G. psoraleoides, *Benth.* An erect herb or undershrub of 2 feet or more, glabrous or nearly so, but more or less glandular-viscid. Leaflets usually 9 to 11, from elliptical-oblong to linear, $\frac{3}{4}$ to 1 in. long, or rarely more, bordered with minute grandular teeth. Flowers small, whitish, in pedunculate racemes or interrupted spikes. Calyx about $1\frac{1}{2}$ lines long; petals about twice as long. Ovules 2; pod reddish, about 3 lines long, flattened, burr-like, the processes uncinate, sutures slightly thickened, indehiscent, containing 1 or 2 brown, slightly-veined seeds.

Hab.: St. George, *Jos. Wedd.*

Order SOLANACEÆ.

SOLANUM, Linn.

S. Sturtianum, *F. v. M.* in Trans. Phil. Soc. Vict. 1, 19, and in Hook Kew Journ. viii., 166. Flora Austr. iv., 455. (After Captain C. Sturt.) An erect shrub of 2 or 3 feet, with a close stellate silvery tomentum, prickles few on the young shoots. Leaves petiolate, oblong or lanceolate, obtuse, entire or scarcely sinuate, 1 to $1\frac{1}{2}$ in. long. Peduncles bearing a short raceme of a few rather large flowers, pedicels very short at the time of flowering, but lengthening afterwards. Calyx about 2 lines long when in flower, with short teeth, much enlarged and irregular, lobed when in fruit. Corolla $\frac{3}{4}$ to 1 in. diameter, with short, broad lobes. Anthers tapering upwards. Berry globose black, bitter, above $\frac{1}{2}$ in. diameter. Seeds blackish, oblique orbicular reniform.

Hab.: Thargomindah, *P. J. Leahy.* Sent as a poison plant; symptoms, diarrhœa and scouring, which continued until death.

Order BIGNONIACEÆ.

DIPLANTHERA, R. Br.

D. hirsuta, (n. sp.) Described by collectors as a small tree. Branchlets quadrangular and densely hirsute. Leaves opposite or in whorls of three, narrow-lanceolate in outline, but very irregular, the ends of some being broadly truncate, attaining 20 inches in length, with a breadth of 6½ inches about the centre, margins repand, crenulate, or deeply and very irregularly toothed, base cordate, and much undulate, petioles ½ to 1½ in., hirsute. Calyx ½ in. long, campanulate, coriaceous, appearing 3-lobed from 4 of the lobes being joined in pairs to near the apex, forming as it were two broad emarginate lobes, hairy outside, the inside bearing minute scale-like glands. Corolla yellow, ringent, 1 in. long, spreading to 1½ in. wide, the lobes blunt, longer than the tube. Stamens exceeding the corolla by about 1½ in.; style about the length of the stamens, the stigmatic lobes ovate-apiculate.

Hab.: Stony Creek, Cairns (a shoot and loose flowers), *L. J. Nugent.* A large leaf and very young shoot gathered on Thursday Island, *E. Cowley.*

Order ORCHIDEÆ.

LIPARIS, Rich.

L. Nugentæ (n. sp.) (After Mrs. L. J. Nugent, a collector and cultivator of Queensland Orchideæ). Epiphyte. Rhizome creeping, producing scape-like stems with the lower part covered with equitant leaves, but ultimately thickens into compressed, deep-green pseudo-bulbs, 2½ in. high and 1 in. broad, bearing usually two linear-leaves of from 8 to 12 in. long and 1 in. broad, sharply keeled and showing on each side of the midrib 1 or 2 well-marked longitudinal nerves, sheathing base short, apex somewhat abruptly acuminate; the pseudo-bulb always bearing on its crown the remains of the old peduncle. Rhachis of flower raceme quadrangular, number of flowers about 9. Bracts fugacious, very narrow. Pedicels 8 lines long. Sepals about 6 lines long and scarcely a line broad, linear, with revolute margins, the petals still narrower but quite as long, all reflexed and somewhat curled, pale cream-coloured, no markings or veins visible. Labellum somewhat rhomboid when flattened out, erect to about the height of the column, or about half its length, then suddenly recurved, widening at the bend and almost forming a tooth on either side, otherwise margins entire, apex obtuse-apiculate; disk with 2 thickened ridges stained a deep orange colour, but scarcely raised into plates except quite at the base. Column white incurved, 3 lines long, base rather broad, upper part slightly expanding into wings. Anther small, flat apiculate in front like the rostellum; pollen-masses pale. (Plate III.)

Hab.: Mountain range near Cairns, *L. J. Nugent.*

DENDROBIUM, Sw.

D. speciosum, var. Bancroftianum, *H. G. Rchb. f.* Plant with the robust habit of *D. speciosum,* var. *Hillii,* but segments of

flower longer and narrower. Labellum of a light sulphur colour, with a few minute atoms of purple at the base, and the keel dark yellow.—From *Gard. Chron.*, 18th June, 1881.

Hab.: The only specimens I have seen which might belong to the above were flowering in the Bowen Park bushhouse, and Mr. Soutter informed me the plants were received from Mt. Dryander.

D. s., var. grandiflorum (n. var.)- This variety has the strong more vigorous habit than *D. speciosum*, var. *Hillii*; the leaves often over 1 ft. long and near ½ ft. broad. The distinction, however, is mostly in the flowers, which are of a deep yellow from first expanding until they decay; the segments are 1½ in. long, the outer ones 3 lines, the inner ones 1½ lines broad. Labellum very obtuse and barred throughout with purple.

Hab.: Eumundi, and plant now (September) flowering at Bowen Park.

D. s., var. curvicaule (n. var.) Stems curved, some almost into a half-circle, compressed, 9 to 12 in. long, the broad diameter often obtaining 1½ in. Leaves very coriaceous, oblong, the end somewhat pointed, about 5 in. long, 2 in. broad, often concave. Peduncle with raceme 9 or 10 in. long, bearing numerous cream-coloured flowers; bracts of the peduncle exceeding 1 in. long, cymbiform, quite coriaceous. Pedicels 1 in. long. Sepals 6 or 7 in. long, 3 lines broad, thick, linear curving outwards. Petals linear, about as long as the sepals, thick, glossy, curving outward, 1 to 1½ lines broad. Labellum falling away from the column more than any of the other forms of this species; in its natural position about ⅔ the length of the other segments, of thick coriaceous substance like the other parts of the flower, lateral lobes longer than broad, middle lobe broad as long, slightly apiculate. Disk bearing a thick ridge, all parts of the labellum marked with thick purple bars, and the base of the column and disk stained with an orange colour. Column short, spur broad, anther small, pollen-masses light-coloured.

Hab.: Lady Elliot's Island, from whence Mr. Soutter received the plants now (September) flowering in the bushhouse, Bowen Park. The present with var. *fusiforme* and var. *delicatum* being in general appearance so different from other forms of the species, will likely in cultivated collections receive specific rank.

BULBOPHYLLUM, Thouars.

B. intermedium, (n. sp.) (Name suggested by its position being intermediate between *B. Shepherdi* and *B. aurantiacum.*) Rhizome creeping, forming straggling patches upon the branches of trees. Pseudo-bulbs oblong, 1½ to 2 lines long. Leaves ¾ to 1 in. long, thick, deeply channelled above, convex underneath. Peduncles 1-flowered, 3 lines, or with the ovary, which is fluted, 4½ lines long. Bracts thin, scarious, 2 or more at the base and another subtending the flower. Sepals 2½ lines long, points orange-yellow, subulate, smooth; thin, fluted, and swelling out at the base, thus giving to the flowerbud a grape-seed form, lateral sepals adnate to the basal projection of the column. Petals oblong, deeply emarginate, hyaline, about ⅓ the length of the sepals. Labellum claw incurved upon the reddish-brown elongated end of the column, the lamina reddish-brown; prominently recurved oftentimes forming a circle, margins revolute,

disk bearing 1 or 2 somewhat thick raised lines along the centre. The erect portion of the column very short, white, with 2 subulate teeth. Anther and pollen-masses pale-coloured.

Hab.: The above description is drawn up from specimen off a plant growing on one of the posts of the Bowen Park bushhouse, which Mr. W. Soutter informs me he received from Hinchinbrook Island about March, 1891.

GASTRODIA, R. Br.

G. ovata (n. sp.) Creeping stems about 1½ in. long, deep-green, fleshy, constricted at the nodes, almost moniliform, internodes of very irregular form. Flowering stems very slender, about 3 in. high, clothed by weak hairs, usually bearing at the base 1 to 3 ovate-acuminate or cordate leaves, 6 to 12 lines long, petioles somewhat broad, sheathing base short and loose; between these and the flowers are usually 1 or 2 oblong or lanceolate, loose scales. Flowers about 3, almost sessile, their subtending bracts narrow-lanceolate. Perianth campanulate, lobed by the free upper portions of the segments; the outside somewhat furfuraceous, dirty-white stained with red, scarcely exceeding 3 lines. Labellum on a rather long claw, lamina broadly oblong, margins undulate, bearing on the disk 2 dark thick lines, merging into 1 on the claw. Column short except for a long terminal appendage. Anther large, giving a gibbous appearance to the dried perianth. Pollen copious, yellow. Capsule ovoid-oblong about 5 lines long. Seeds long, narrow-winged.

Hab.: Mountain Range, near Cairns. *L. J. Nugent.*

ADDITIONS TO THE NEW GUINEA FLORA.

Order ORCHIDEÆ.

OBERONIA, Lindl.

O. papuana (n. sp.) Stem about 2 in. wide at the base, mostly formed from the thick and largely expanded clasping leaf-sheaths. Leaves 6 to 8 in. long, tapering from a widely stem-clasping base to an obtuse, oblique, or unequally sided end, where it is more or less torn or toothed. Peduncle 4 or 5 in. long, somewhat flattened, nearly 2 lines diam ; raceme about 6 in. long, flowers crowded. Bracts of peduncle membranous, closely stem-clasping, keeled, and ending in filiform points, those subtending the flowers much narrower and spreading. Pedicels of flower rather short ; a little longer on the fruit. Sepals broadly triangular, with a rusty reticulation on the outside. Petals ovate, apiculate, about as long as the sepals, but only half as broad, white, margins entire. Labellum large, white, broadly-cordate, with entire margins. Column short, pollen-masses amber-coloured. Capsule angled and somewhat tuberculate.

Hab.: New Guinea. The above description is written from a sketch with notes and a raceme of flowers received from Mr. H. Dixson, of Sydney, who possesses an extensive collection of Australasian Orchideæ. I have descriptions of a large number of Oberonias, none agreeing with the above, in my opinion. Therefore have attached the above provisionally.

DENDROBIUM, Sw.

D. Chalmersii, *F. v. M.* Southern Science Record II., No. 5, page 96. Stems about 12 or 14 in. long and somewhat flattened, slender at both extremities, more or less swelling out about the centre, and prominently fluted, leafy often for a third of their length. Leaves of somewhat thin texture, linear-lanceolate 3 or 4 in. long, $\frac{1}{4}$ to $\frac{1}{2}$ in. broad, sheath closely adhering to the stem, apex obliquely emarginate, the midrib and 2 or 3 longitudinal veins on either side prominent. Racemes slender, 3 or 4 in. long, bearing about 7 flowers. Bracts minute. Pedicles $\frac{1}{2}$ to $\frac{3}{4}$ in. long. Sepals $\frac{1}{2}$ in. long, broad at the base, tapering to narrow points. Margins almost entire, creamy-white, at first recurved, ultimately curled, the dorsal one from being attached to the whole length of the column never showing a curl. Petals same colour and about as long as the sepals, linear lanceolate, erect, and spirally curled, with thread-like points and serrulate margins. Spur short and very obtuse. Labellum much larger than the other segments, the lateral lobes at first clasping the column, beautifully marked by forked lilac-coloured veins upon a white ground, somewhat narrow, forming a blunt tooth-like end ; middle lobe sulphur-coloured, broad, reniform, or if flattened out somewhat rhomboidal, for the whole is very wavy and the point abruptly reflexed. Disk-plates 3, rather prominent with lilac-coloured edges. Column curved with narrow lilac speckled wings, ending in minute teeth at the top. Anther-lid small ; pollen-masses clavate-oblong or nearly oblong, golden-coloured.

Hab.: The above is from a plant now (July, 1896) flowering in the Brisbane Botanic Gardens, which was received from New Guinea.

D. bifalce, *Lindl. in Hook. Lond. Journ. of Bot.*, II., 237 (name referring to the sickle-formed lateral lobes of the labellum). Erect stems rather distant, 12 to 15 in. high, fusiform, fluted, arising from a shortly-creeping, branched rhizome. Leaves coriaceous, 5 in. long, 2½ in. broad, oblong, about 4 near the end of the stems. Peduncle from the axil of the lowest leaf about 8 in. long, hard, rigid, bearing 3 or 4 distant minute, membranous, obtuse, closely clasping bracts, and 3 rather long pedicellate dingy-coloured flowers near the end. Sepals almost deltoid, incurved, 5 lines long, 3 lines broad, marked on a greenish-yellow ground with dotted purplish lines. Petals oblong, incurved, about the length of the sepals but not half as wide, spur broad, flattish, and slightly incurved, thus helping with the segments to give a somewhat cup-like form to the flower. Labellum clasping the column, never seeming to fully expand, longer than the other segments, claw broad, lateral lobes narrow, falcate, brown, middle lobe broad, retuse, darker than other parts of the flower and speckled with purple. Disk plates 2 erect, each divided longitudinally on the upper margin into a double frill. Column short and broad. Anther flattish, the pollen-masses in the two fresh flowers which I examined resembling dry hard pieces of amber not at all adhesive (probably abortive).

Hab.: New Guinea. The above description is drawn up from live specimens received from Mr. H. Dixson, of Sydney. This plant is given as a *Doritis* Lindl., by Reicht., f., *Xen. Orch.*, II., 7, and also in Benth. and Hook., Gen. Pl. III., 575. The species is, however, but little known, so is placed here under its first name.

ERIA, Lindl.

E. parviflora (n. sp.) Stem or pseudo-bulb about 2 in. long, cylindric, and about ½ inch in diameter. Leaves 2 linear, ¾ inch broad, obtuse and unequally emarginate at the apex, about 6 in. long, but the lower third of the length tapering in the form of a petiole. Spike 1 in. long, scaly, hairy, as well as the flowers, which are rather crowded. Bracts long as ovary, about 1 line, sepals stained with purple, 1 line long, tips somewhat saccate, petals long as the sepals, silvery. Labellum 3-lobed, lobes blunt and about equal in size, purplish, of a thick texture, disk-lines 4, not very prominent; column short. Pollen-masses very pale-coloured and not well matured in the flowers examined.

Hab.: New Guinea. Described from plants received some years ago from Sir William MacGregor, now (October) flowering in Botanic Gardens.

GOODYERA, R. Br.

G. ochroleuca (n. sp.) Stems deep-green, 15 in. long, 3-4 lines diam., procumbent, emitting thick, fleshy, scaly roots from the lower joints. Leaves several, about 5 in. long, 2-3 in. broad, ovate-lanceolate, tapering into a petiole and then expanding into a rather short stem-clasping base, 5-7-nerved. Scape about 1 ft. high, the upper portion angular and hirsute, with short rather stiff hairs, weaker and more scale-like on the lower portion. Bracts narrow-lanceolate, the lowest with long stem-clasping sheaths. Flowers sessile, ovary about 3 lines long, thick, hirsute. Sepals about 3 lines, ovate, shortly hirsute on the outside, glabrous inside, slightly hooded at the apex, dingy-brown, lateral ones spreading, dorsal bending over the column Petals oblong-lanceolate, nearly as long as the sepals but much narrower, both much

overlapped by the dorsal sepal, thinner, and of a lighter colour than the latter. Labellum ventricose, almost globose, light or almost white, turning to a sulphur-coloured, abruptly ending in a much recurved blunt nearly white point, the disk, or rather the whole face of the labellum, closely covered by prominent erect yellow calli. Column white, thick, nearly as long as the sepal, not winged, but ending at the top on each side in a tooth (these two teeth forming the rostellum), between which the beak-like point of the anther-lid rests. Anther rostrate, pollen-masses pale-coloured. (Plate IV.)

Hab.: New Guinea. Described from plants which were brought some few years ago by Sir W. MacGregor from New Guinea for the writer, who handed them over to the Brisbane Botanic Garden. The present species in some respects would seem allied to *G. Waitziana*, Blume, differing in the more numerous flowers and in the form of labellum, calli, and rostellum.

Order LYCOPODIACEÆ.

LYCOPODIUM, Linn.

L. albescens, (n. sp.) (Name suggested by the species turning to a more or less whitish hue when fading.) Plant epiphytical, frequently of a pale colour, caused by a slight pulverulent covering, particularly on the extremities. Stems robust, at first often erect, ultimately pendulous, 2 to 3 feet long, $\frac{1}{3}$ to $\frac{3}{4}$ in. diameter including the leaves, repeatedly dichotomously forked. Leaves lanceolate-subulate, falcate, the points turned towards the stem, in 5 or 6 rows, of a firm texture, and often exceeding $\frac{1}{2}$ in. in length. Sporangia in the axils of the leaves of the branchlets, which only differ from the lower leaves in their smaller size.

Hab.: A fine plant of the above is growing in the hothouse, Bowen Park, which Mr. Wm. Soutter informs me he received a few years ago from Capt. Michael, who discovered it at South Cape, New Guinea. According to descriptions in Baker's monograph "The Fern-Allies," this new species is allied to the tropical American *L. taxifolium* in some respects, and to the Borneo and Malay Peninsula species *L. Dalhousieanum* in others.

Order FILICES.

ASPLENIUM, Linn.

A. nidus (Linn.) Plates V. and VI. represent lobed fronds found on native plants of this common fern, by Mr. L. J. Nugent, of Mackay.

Order FUNGI.

CORTICIUM, Fries.

C. scutellare, *B. and. C.* Grev. II. 4. Massee Mon., p. 128. Resupinate, broadly effused, immarginate, whitish then tan-coloured, hymenium splitting into minute areolæ, spores ellipsoid, 5 x 3 μ. *Dr. M. C. Cooke*, in letter.

Hab.: Found coating the branches of sickly dying trees in neglected Queensland gardens.

By Authority: Edmund Gregory, Government Printer, William street, Brisbane.

PLATE I.

Dyscoxylum cerebriforme, *Bail.*

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6

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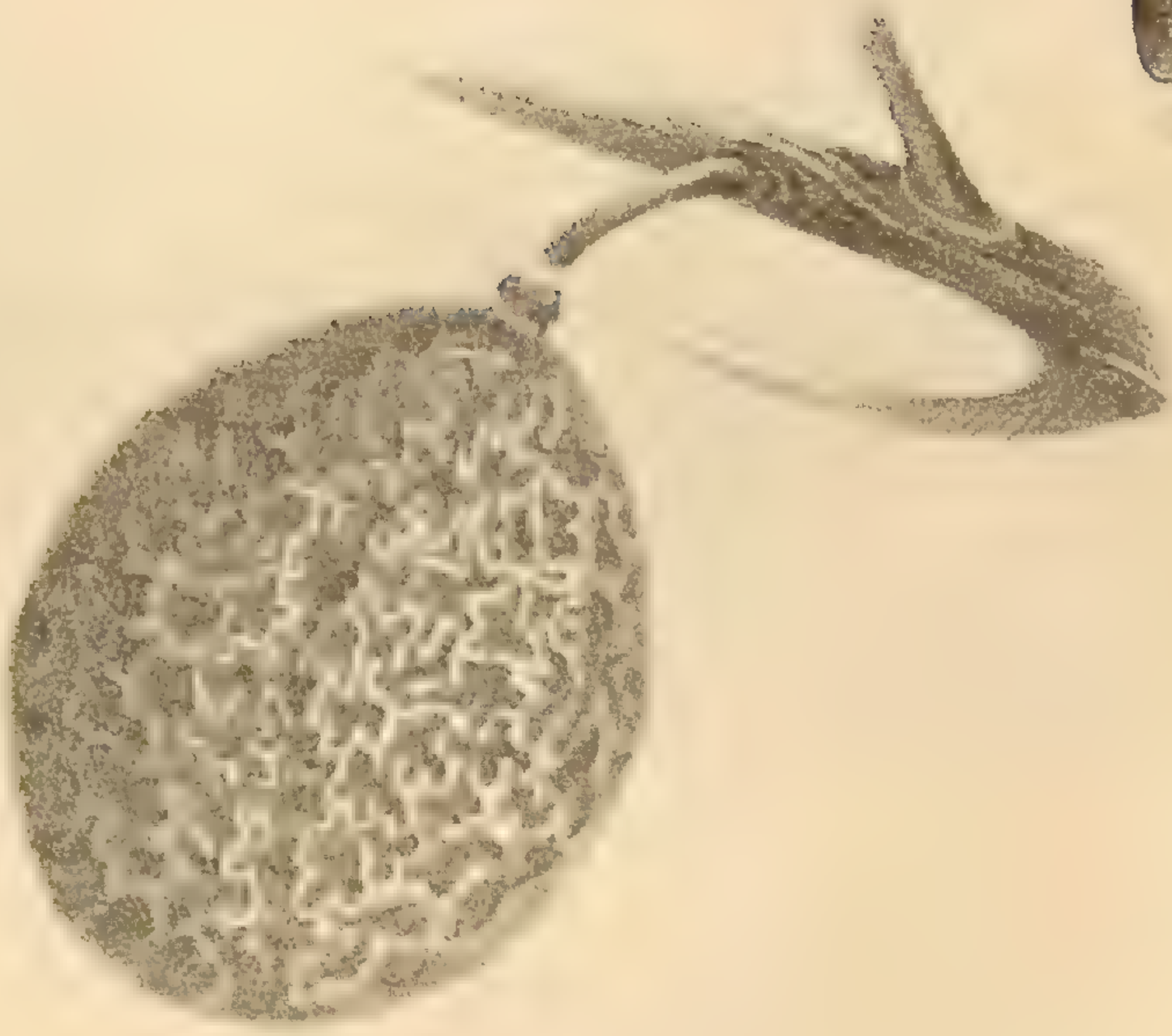

1

Dysoxylum cerebriforme *Bail*

Liparis Nugentæ, *Bail.*

PLATE IV.

Goodyera ochroleuca, *Bail.*

Asplenium nidus.

Asplenium nidus.

Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BOTANY BULLETIN No. XV.

JUNE, 1898.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane.

BRISBANE:

BY AUTHORITY: EDMUND GREGORY, GOVERNMENT PRINTER, WILLIAM STREET.

1898.

PREFATORY NOTICE.

In issuing the present Bulletin, I have first to thank the various collectors for kindly forwarding to me the material, and then the specialists who have devoted much time and trouble in the determination of these wondrous forms of vegetable life; and in this part I must particularly mention the names of Professors Askenasy, Mœbius, Nordstedt, Schmidle, and Borge. In fact, the main part of the present Bulletin is from pamphlets published in German by these last two gentlemen, the translation having been kindly undertaken for me by my friend Mr. W. J. Byram, who, it will be remembered, rendered me the same services when publishing my two former Freshwater Algæ Bulletins, Nos. VI. and XI. The present Botany Bulletin, XV., or the third one on the subject, contains an account of nearly as many kinds as the two former together, and even now the subject has barely been touched upon.

To give some idea of the vast number of these plants in Queensland waters, I may mention that upon a specimen of *Chara australis*, var. *lucida*, collected by my friend Dr. Thos. L. Bancroft in the waters of our Gulf country. Professor Otto Nordstedt, of Lund, a noted specialist on Characeæ, who has always determined these plants for me, found 16 Cosmarium, 6 Euastrum, 5 Docidium, 2 Micrasterias, 2 Onychonema, 1 Xanthidium, 2 Desmidium, 1 Penium, 3 Staurastrum, 2 Arthrodemus, 1 Œdogonium, 1 Bulbochæte, 1 Coleochæte, 1 Kirchneriella—in all, 43 kinds, including several new forms.

It is a pleasing feature and one most gratifying to workers like myself to find persons in this colony of ours, where the one object of life seems to be to become rich, who are willing to devote some portion of their time to collect for determination these, which are often termed, lower forms of vegetation. Where the collectors possess microscopes it may be said they have their reward, for more beautiful objects it would be impossible to find; and when the money lover comes along and asks the oft-put question, "What's the good of these minute forms of plant life?" he can be answered by using Pope's words—

> Has God, thou fool! worked solely for thy good,
> Thy joys, thy pastime, thy attire, thy food?

We cannot say why these things were created, but may be sure that they perform some important work in the general arrangement of creation, and if by their wondrous forms they lead the mind from Nature up to Nature's God they have not been made in vain.

F.M.B.

January, 1898.

BOTANY:

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

QUEENSLAND FRESHWATER ALGÆ.

COLEOCHÆTE, Bréb.

C. scutata, *Bréb.* (see Bot. Bull. VI.).

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

C. irregularis, *Pringsh.* (see Bot. Bull. VI.).

Hab.: Mitchell River, fertile specimens, *Edw. Palmer.*

ŒDOGONIUM, Link.

Œ. undulatum, *Bréb.*

Hab.: Johnstone River and waters of the Gulf country, *Dr. Thos. L. Bancroft;* Norman and Gilbert Rivers, *T. Gulliver.*

Œ. sp., *Borge.* (Plate XIII.) Diœcious; nanandrous; oogonia single or 2-4 in a series, subglobose; the oospores globose, almost filling up the oogonia; dwarf males placed upon support cells. Thickness of vegetative cells, 14-18 μ; height about 5 times as large. Length of support-cells 69 μ, thickness 38 μ; length of oogonia, 40-48-48-49 μ; thickness of oogonia, 40-42-45 5-47 μ; length of oospore, 39-44-46-42 μ; breadth of oospore, 39-41-45-43 μ.—*Borge.*

Hab.: Between Norman and Gilbert Rivers, *T. Gulliver.*

Œ. undulatum, var. Mœbiusii, *W. Schmidle.* This form approximates very nearly to the var. *incisum*, Hansg., which, according to Nordstedt, likewise occurs in Australia. It differs from the latter in exhibiting a light margin not only in both the lateral undulations of the cell, but also in the middle one. Between every two of the four deeper constrictions, therefore, a shallower one always occurs. On this account the undulations are somewhat less pronounced than was the case at least in the specimens of the var. *incisum*, Hansg., discovered by me in Germany. Diameter of the cell, 12-17μ; the length is 4-6 times as great as the breadth. This alga is figured by Mœbius in Bail. Botany Bulletin No. 11 (Plate IV, fig. 13), and is briefly described on page 17 as *Œdogonium spec.*—*Schmidle.*

Hab.: Blackstone, Ipswich, *W. J. Byram*, June, 1895. (Plate II.)

Œ. punctato-striatum, *De Bary.* Oogonia single, depressedly globose, manifestly splitting round (circumscissile in the middle), opening by a pore in the fissure; oospore depressedly globose, nearly filling the oogonia; male plant a little slenderer than the female; spermagonia 3-7 celled; spermatozoids single; membrane of the

vegetative cells and of the oogonia spirally punctate; basal cell depressedly globose; membrane vertically plicate. Size—Cells: female ·018-·022 mm., 2-6 times as long; cells: male ·016-·019 mm., 2-6 times as long; oogonia ·048-·055 × ·038-·048 mm.; oospore ·044-·051 × ·045-·043 mm.; sperm cell ·016-·018 × ·006-·01 mm. Distinguished by the cell wall being marked by spiral striæ of a dotted character, finely and closely set; these seen in an empty cell, through and through, the upper and lower striæ being nearly in focus simultaneously produce a somewhat decussate appearance.—Cooke's Freshwater Algæ, 167. (Plate V.)

STIGEOCLONIUM, Kuetz.

S. Askenasyi, *W. Schmidle.* The following is Professor Schmidle's description of this new species:—

"The plant barely 2-5 cm. high forms small tufts growing on stones. In their basal portion they consist of very narrow cells generally only 8-10 μ broad, which are usually 3-4 times longer than broad and either not at all or only slightly constricted at the ends. The undermost cell is prolonged into rhizoids: these are also met with higher up but only in small numbers, and they then lie close to the stem. From the basal-cell onwards the filament continuously widens, and attains in the middle of the stem a breadth of as much as 32-40 μ, from which point again diminution takes place. At the same time the cells become shorter, so that in the middle and upper portion of the filament they are generally shorter than broad. Yet here one or more very long cells are met with abruptly, almost regularly beside a row of very short ones. Since these moreover for the most part suddenly become still narrower than the under short cells the impression is produced that here as it were the stem renews itself. (Plate I., Fig *b*.)

"Whilst the cells further in the basal portion of the stem are of regular, rectangular shape, the outlines of those further away from it are altogether irregular. They are often constricted at the ends. often not; they usually widen at the vertex, and since then the following cells with narrower base are placed upon them the filament acquires a tapeworm-like form. Figs. *a* and *b* at the upper part. (Plate I.)

"The branching is twofold. Sometimes short, small-celled, unbranched branchlets proceed from the main-axis, with narrow rectangular cells barely 8 μ thick and 3-4 times as long and with scarcely diminished, broadly-rounded, hairless terminal cells. All the cells of these branchlets undergo subdivision (often lengthwise), become inflated, and are converted into sporangia (spore-branchlets). They occur very scattered and irregular on the main-axis, and become very abundant and thickly crowded together only at the end itself.

"Very rarely, in the basal portion wholly absent, becoming scarcely more abundant and irregularly distributed towards the upper part, are found the branches proper. They are likewise relatively very short, and are likewise only given off singly. Their cells are short and thicker (as much as 20 μ), and resemble in all respects those in the upper and middle portion of the stem.

"Only rarely do these branches bear upon them even those of the second rank. They are thickly covered with spore-branchlets generally from their base, or at all events in the upper portion, just as is the case with the vertex of the stem.

"It is further noticeable that the filaments, and particularly the clusters of the spore-branchlets, are abundantly furnished with a glutinous envelope containing carbonic acid, so that the spore-branchlets often only become clearly visible after treatment with muriatic acid. The chlorophyll of the longer cells covers, as in *St. amœnum*, Ktzg., only the middle portion of the cell.

"The following appear to me to be the distinguishing characteristics of our plant:—(1.) The narrow and long-celled basal portion well-developed with regular almost rectangular cells (2.) The irregular-shaped cells of the rest of the plant, sometimes short sometimes long, but usually very short. (3.) The glutinous envelope and the branching."

APHANOCHÆTE, A. Br.

A. repens, *A. Br.*

Hab.: Between the Norman and Gilbert Rivers, *T. Gulliver.*

MICROSPORA, Thur.

Articulate thread simple. Chlorophyllose mass at first parietal, afterwards contracted in the centre. All articulations fertile.

Propagation by zoogonidia. Zoogonidia arising from a simultaneous division of the cell contents, small, numerous, ovate-elliptical, cuspidate and colourless at one end, usually furnished with 2, rarely 3 to 4, cilia, escaping by rupture of the cell.—Cooke's Freshwater Algæ, 135.

M. abreviata (*Rabh.*), *Lag.* (*Conferva abbreviata*, Rab., in Wolle's F. W. Alg., U.S.) Small cæspitose tufts, attached, green, but often discoloured, ferruginous; articulations short cylindrical, not constricted at joints, nor swollen; cells before division not exceeding 2 diameters, usually as long as broad. Cell membrane thin, hyaline, homogeneous; chlorophyll evenly distributed. Diameter, 6-7½ μ.—Wolle *l. c.*

Professor Schmidle says:—Our alga agrees well with the diagnosis contained in "De Toni Sylloge Algarum" I., and with Kützing's figure in Tab. Phyc. III., Plate 42, Fig. VIIIc. In the present case, however, it does not form flakes, but is separate, growing upon water-plants. The cells are 9 μ broad and 12 μ long. (Plate V.)

Hab.: Bowen Park, Brisbane, *W. J. Byram.*

M. pachyderma (*Wille*), *Lagerh.*

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

CONFERVA, Lag.

C. bombycina, var. pallida, *Kuetz.* Professor Schmidle says—"The cells are 4 μ broad, 16-18 μ long, and somewhat constricted at the ends."

Hab.: Bowen Park, Brisbane, *W. J. Byram.*

GLÆOCYSTIS, Näg.

Cells globose or oblong, either single or 2-4-8, associated in globose families. Common and special integument gelatinous, lamellose. Division in alternate directions. Propagation by zoogonidia.

The lamellose tegument distinguishes the species of this genus from *Pleurococcus*.

G. vesiculosa, *Näg.* Thallus gelatinous, green; cells small, globose, as many as 64, and more, associated in families; tegument hyaline, colourless, lamellose, lamellæ often breaking up; contents green, delicately granular. Size—Cells ·0045-·0075 mm.; fam. ·036 mm. (Rabh.) (Plate V.)

In Europe, found on wood and stones in stagnant water.—Cooke's Freshwater Algæ, 7.

Professor Schmidle notes this alga as present in the collection of Mr. W. J. Byram from Blackstone, near Ipswich.

TETRASPORA, Link.

T. explanata, *Ag.* Thallus forming an irregular expansion, as much as 2 cm. in breadth, lamellose often blistered, soft, green, free swimming or fixed; cells elliptical or obtusely angular, 5·5-16 μ diam., both solitary and adhering in pairs (more rarely in fours).

Hab.: In still clear water, adhering to stones and plants or free swimming, universally throughout Europe, especially in Switzerland, also in North America (Wolle).

Hab.: Queensland; locality and collector not recorded.

TRACHELMONAS, Ehrberg.

T. volvocina, *Ehrberg.*

T. hispida, *Stein.*

Hab.: Professor Schmidle found these species, the first in abundance, the latter more rarely, in Mr. W. J. Byram's collection from Bowen Park, Brisbane.

VAUCHERIA, Dl.

V. sp., *Schmid.* The determination of this specimen is not complete. Professor Schmidle says:—"Merely the ripening oogonia of the plant were found. According to their characteristic shape (they were semi-circular, the basal diameter, however, somewhat convex and furnished at both ends with obtuse somewhat protuberant thickenings of the cell-membrane, 98 μ long and 64 μ broad), I believe that I can come to the conclusion that they belong to *V. terrestris* Lyngb., which perhaps grew on the margin of the place where they were collected.

Hab.: Blackstone, Ipswich, *W. J. Byram.*

OPHIOCYTIUM, Näg.

O. majus, *Näg.*

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

TETRÆDON, Ktzg.

T. gigas (*Reinsch.*), *Hansg.*, f. tetrædrica, *Nordst.*

Hab.: Herston road, occurring throughout the collection made in this locality by *Mr. W. J. Byram.*

T. vulgare, *Ktzg.*, f. major, *Reinsch.*

Hab.: Herston road, *W. J. Byram.* Professor Schmidle did not find this form quite so common in the collection as the preceding.

CŒLASTMUM, Näg.

C. sphæricum, var. subpulchrum, *Lag.* Professor Schmidle gives the following note with the foregoing species:—

"This variety approximates very nearly to the var. *compactum*, Mœb., and differs only in the more or less developed arm by which the cells are connected with each other. Since then the development of this arm, which I have already noticed in 'Hedwigia,' 1895, p. 297, is very variable; it seems probable to me that both forms are to be classed as belonging to the same species. *Cœl. distans*, Turner; *C. subpulcrum*, Lag.; *C. indicum*, Turner; and *C. sphæricum*, var. *compactum*, Mœb., constitute a connected series of forms, of which each following one displays somewhat slighter development of the arm, and which otherwise display no further essential differences.

"In material which I lately received from R. Lauterborn, from the Old Rhine at Neuhofen, almost all these forms were present together, besides those specimens whose cells possessed a vertex prolonged outwards and there often truncated, and which thus pass into the typical *C. sphæricum*, Näg. This mutual occurrence clearly indicates a genetic connection.

"It is questionable whether *C. pulcrum* also, which differs from the recognised forms in each cell having upon its vertex a rectangular short hyaline prolongation directed outwards, is to be classed with *C. sphæricum*. I have not hitherto been able to recognise a tendency to vary in this direction, although it is perhaps not improbable."

Hab.: Herston road, Brisbane, *W. J. Byram.*

C. pulchrum, *Schmidle.* Beitr. Alg. Schwarzwald, page 12, Tab. II., fig. 10.

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

DICTYOSPHÆRIUM, Näg.

Cells elliptic, with thick confluent mucous investment, combined in numbers into free-swimming, one-layered, hollow-globular families, one always at the ends of delicate threads which proceed from the central point of the family, and which become repeatedly branched towards the periphery; divisions at the commence of the series of generations in all directions of space; afterwards, as regards the middle point of the aggregate family, as a rule, alternating only in the two tangental directions.—Cooke's Freshwater Algæ, 20.

D. pulchellum, *Wood.* Wolle gives this as a synonym of *D. Ehrenbergianum* Näg. With the following description:—"Family subglobose or suboval; cells somewhat ovate or subglobose, with thin smooth membrane. Diameter of cell, 4-7 μ." (Plate V.)

Hab.: Professor Schmidle notes this form as occurring in the collection obtained from Jenkins' Quarry, Bundamba, by *Mr. W. J. Byram.*

GLÆOTÆNUM, Hansg.

G. Loitlesbergereanum, *Hansg.* The following is Professor Schmidle's note:—"Abundant in the collection from Jenkins' Quarry, made by Mr. W. J. Byram. It is perhaps worthy of notice that in this habitat *Cylindrocapsa geminella*, Wolle, of which our alga should, according to Stockmayer, be a phase of development, was not present, at all events not in my material. In spite of its abundant occurrence I have only observed the two-celled form, which was moreover distinguished by having the gelatinous envelope at each of the ends prolonged into three lobes in somewhat symmetrical arrangement. (Plate II.)

This alga has hitherto only been known to occur in a few places in Europe and in India. (Plate III.)

SPIROGYRA, Link.

S. Baileyi, *W. Schmidle.* This species is new to science, and we are indebted to Professor Schmidle for its determination and for the following description of it:—"The vegetative cells are 20-24 μ broad, 128-200 μ long; its cell membrane at the ends is not drawn back. They contain two fairly broad chlorophyll bands, with 3-4 revolutions. The fructifying cells are shorter, rather strongly inflated, about 60 μ long and 32 μ broad; the zygotes elliptical with smooth membrane, about 28 μ broad, 48-50 μ long. The species is distinguished by the small horizontal diameter of the relatively long cells and the reduplication of the chlorophyll band. All the species with more than one band enumerated in the section *Conjugata* (Vauch.), Hansg., are broader, with the exception of *Sp. subsalsa*, Ktzg., which is easily distinguished in consequence of its short cells. Of the species with one chlorophyll band the following approximate to it on account of their small cells:—*Sp. mirabilis*, Ktzg., *Sp. gracilis*, Ktzg., *Sp. polymorpha*, Ktzg., and *Spirog. longata*, Ktzg. Of the latter species, Cooke, in British Freshwater Algæ, p. 92, mentions that they also possess two chlorophyll bands and inflated fruit-cells. This appears to me to be wrong. Kirchner, in the 'Algæ of Silesia,' p. 123, lays stress upon the single chlorophyll band as characteristic of the species referred to, and Petit, in the 'Spirogyrae,' besides the single band, does the same with regard to the non-inflated spore-cells." (Plate II.)

Hab.: Enoggera district; sometimes growing upon other plants, sometimes forming green masses.

SIROGONIUM, Ktzg.

Cells with parietal longitudinal chlorophyll bands. Fructifying cells diverse, arising by unequal division of the thread-cells, bending knee-like towards each other and growing together, united at the point of adnation; receiving-cell barrel-shaped; giving-cells short cylindrical. Zygospore (elliptic) in the receiving cell-wall. The sterile cells, with parallel chlorophyll bands, resembling those of *Spirogyra*, but differ in the genuflexuous conjugation.—Cooke's Freshwater Algæ, 97.

S. strictum, *Ktzg.* Sterile cells 2 to 5 times as long as broad. Zygospore broadly elliptical, spore coat double. Sporiferous cells swollen, abbreviated. Size: Cells ·04 to ·05 mm., 2 to 5 times as long. Zygospore ·042 x ·075 mm.—*Cooke l.c.*

It forms large masses on the water, full of air bubbles, being pale and yellowish above, and of a blackish green beneath. Filaments not lubricous, nearly equalling those of *Spirogyra nitida*, but with much longer articulations. When young the colour is of a dull pale green, and about three imperfectly spiral lines of shining granules are with difficulty distinguishable. Afterwards these lines become more conspicuous, the rest of the filaments being now perfectly colourless, and their component granules larger, but their arrangement is still irregular. The filament subsequently unite here and there, not by every articulation, and their connecting processes are usually nearer to one end of the vessicle than the other. Such filaments are divaricated at the points of connection. In some of the combined articulations the contents appear unchanged, in others they form a mass of larger granules than in the lines, and some have a large oval sporidium which often swells the joints. Some traces of unchanged lines occur now and then in the fructifying vessicle.—Eng. Bot. 2nd ed., p. 176. *Cooke l.c.* (Plate VI.)

Hab.: At Herston road, Brisbane, *W. J. Byram.*

KIRCHNERIELLA, Schmidle.

K. lunaris, *Schmid.* This form was described in Bail. Botany Bulletin No. XI., p. 31, as occurring at Burpengary. Professor Schmidle also notes it as found in the collection made by Mr. W. J. Byram, at Jenkins' Quarry, Bundamba.

K. lunata, *Schmidle.* Beitr. Alg. Schwarzw., p. 15, Plate III, fig. 1-3. (Plate XIII.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

DESMIDIUM, Ag.

D. quadratum, *Nordst.* Length of cell, 19·5-19·5-23 μ; breadth of cell, 27-26-26 μ; breadth at isthmus, 22-21-21 μ.

Hab.: Queensland, Rockingham Bay, *J. Dallachy*; Johnstone River, *Dr. Thos. L. Bancroft.*

D. coarctatum, *Nordst.* Form with broader apices to the cells. Length of cell, 28-29 μ; breadth, 38 μ; breadth at the isthmus, 30 μ; breadth at the apex, 18 μ.

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

D. aptogonium, *Bréb.*

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

D. aptogonium, β acutius, *Nordst.*

Hab.: Between Norman and Gilbert Rivers, *T. Gulliver.*

D. Swartzii, *Ag.*

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

D. bengalicum, *Turn.* Algæ of East India. p. 147, Plate XIX, fig. 1-3. Larger form. Length of cell, 26-27 μ; breadth, 34-35 μ; breadth of isthmus, 26 μ; breadth at apex, 22-24·5 μ. (Plate XIII.)

Hab.: Rockingham Bay, *J. Dallachy.*

D. quadrangulare, *Ktzg.* Ralfs. Brit. Desm., Plate V. Dimensions : 20 : 32 μ.*—*Schmidle.*

Hab.: Herston road, Brisbane, *W. J. Byram ;* Johnstone River, *Dr. Thos. L. Bancroft.* See Bail. Botany Bulletin, No. VI., p. 38, and Plate II., Fig. 27, *a, b,* and *c.*

D. Baileyi, (*R*) *De By.* Dimensions 20 : 20 μ.—*Schmidle.*

Hab.: Blackstone, Ipswich, *W. J. Byram.* See Bail. Botany Bulletin No. XI., p. 37, and Plate X., fig. 4.

D. Baileyi, (*Ralfs.*) *De Bar.* Form *gemima*, Nordst.—Freshwater Algæ of New Zealand, p. 27, Plate II., figs 4-5.

Hab.: Waters of Gulf Country, *Dr. Thos. L. Bancroft.*

HYALOTHECA, Ehrberg.

H. hians, *Nordst.* Professor Schmidle refers to Nordstedt's Algæ of New Zealand and Australia (p. 28, Plate 2, Fig. 9), and assigns to the specimens examined the following dimensions :—32 μ long, 20 μ broad. (See Plate IV.)

Hab.: Enoggera district, *Dr. Thos. L. Bancroft.*

H. hians, *Nordst.* Dr. Borge gives the following :—Length of cell, 18-20 μ ; breadth, 28·5-30 μ ; breadth at isthmus, 26-27 μ ; breadth at apex, 18-20 μ.

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

H. dubia, *Ktzg.*, **var. subconstricta,** *Hansg.*

Hab.: Blackstone, Ipswich, *W. J. Byram.*

H. mucosa (*Mert.*), *Ehrenb.*

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

H. dissiliens (*Smith*), *Bréb.*

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

GYMNOZYGA, Ehrenb.

G. moniliformis, *Ehrenb.*

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

G. moniliformis, var. gracilescens, *Nordst.* Length of cell, 27-29 μ ; breadth, 13 μ.

Hab.: Rockingham Bay, *J. Dallachy.*

SPHÆROZOSMA (Bréb.), Ralfs.

S. excavatum, *Ralfs.*

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

ONYCHONEMA, Wallich.

O. læve, *Nordst.* Length of cell, 15-16 μ; breadth of cell with bristle, 28-29 μ, without bristle 17 μ ; breadth at isthmus, 4 μ.

Hab.: Johnstone River and waters of the Gulf country, *Dr. Thos. L. Bancroft.*

Of the two numbers expressed here and in the following pages, the first always denotes the cell length and the second the cell breadth.

MICRASTERIAS, Ag.

M. oscitans, *Ralfs.*, **var. pinnatifida** (*Kütz.*), *Rab.* Largest form. Length of cell, 94 μ; breadth, 100 μ; breadth at isthmus, 15-16 μ. (Plate XIII.)

Hab.: Endeavour River, *Persieh.* In dimensions this form agrees for the most part with *M. oscitans*; as far as regards the form of the cell, however, it seems to be closely allied to the var. *pinnatifida.*

M. foliacea, *Bail.* Breadth of cell 62-65 μ.

Hab.: Rockingham Bay, *J. Dallachy.*

M. alata. (Plate XIII.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft;* Rockingham Bay, *J. Dallachy:* between Norman and Gilbert Rivers, *T. Gulliver.*

Since hitherto no figure "a vertice" of this species have been published, I have considered it of value to furnish one here.

M. sp., *Borge.* Oblong; narrow at the median suture; semi-cells three-lobed; lateral lobes with sharp inferior apices, superior apices rounded; polar lobe a flattened semi-circle, in the middle slightly hollowed, with sharp corners; not seen from the vertex and side. Length of cell, 49-50 μ; breadth, 30-32·5 μ; breadth of isthmus, 5 μ. (Plate XV.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

M. incisa (*Bréb.*), *Ralfs.*, **var. typica,** *Turner.* Algæ of East India. Long. 50, lat. 50, lat isth. 8-9, lat. lob. pol. s. sp. 36, crass. 12 μ. (Plate IV).

Hab.: Not assigned.

M. incisa, var. Wallichiana, *Turner.* Algæ of East India. p. 89, Plate XIII., fig. 6. Dimensions, 60 : 55 μ.—*Schmidle.* (Plate IV.)

Hab.: Herston road, Brisbane, *W. J. Byram;* pretty rare.

M. decemdentata, *Näg.* Dimensions 80 : 60 μ. Professor Schmidle adds:—"Our specimens agree exactly with the form figured by Mœbius in Bailey Botany Bulletin, Plate XI., fig. 17."

Hab.: Enoggera district, *Dr. Thos. L. Bancroft.* Herston road, *W. J. Byram;* rare.

M. decemdentata, forma, *W. Schmidle.* Professor Schmidle says:—"Of the two minor lobes of each basal lobe the under one is emarginate; the upper one is prolonged into a single point. Dimensions, 100 : 100 μ." This form constitutes perhaps the transition between the two species just referred to. (Plate II.)

Hab.: Herston road, *W. J. Byram.*

EUASTRUM, Ehrenb.

E. circulare.

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

E. sinuosum, *Lenorm.*

Hab.: Johnstone River, *Dr. Thos. L. Bancroft;* Rockingham Bay, *J. Dallachy.*

E. didelta (*Turp.*), *Ralfs.*

Hab.: Rockingham Bay, *J. Dallachy.*

E. ansatum, *Ralfs.*

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

E. ansatum, var. maxima, *Borge* (n. var.). Var. twice as large again; semi-cells each furnished in the centre with a small pit; in vertical view furnished with three sinuations on each side. Membrane smooth. Length of cell, 173 μ; breadth, 78 μ; breadth of isthmus, 19-20 μ. (Plate XIII.)

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

E. asperum, *Borge* (n. spec.). A large *Euastrum;* median notch deep and widened; semi-cells three-lobed, furnished at the base with 5 stout spines and in the middle with 2 pits; polar lobe scarcely dilated, deeply notched at the apex, furnished with a sharp tooth on each side; lateral lobes with 2 lobules, lobules bidentate; lateral appearance wedge-shaped—not seen from the vertex. Length of cell, 82 μ; breadth, 45-46 μ; breadth of isthmus, 10-11 μ. (Plate XIII.)

Hab.: Rockingham Bay, *J. Dallachy.*

This species is clearly closely allied to *E. rostratum, b præmorsum,* Nordst., with which it agrees in general appearance when viewed from the front; on account of its peculiar armament and its lateral aspect I have thought that I should classify it as a separate species.—*Borge.*

E. ansatum, forma biscrobiculata, *W. Schmidle.* The following is Professor Schmidle's description of this new form:—"Dimensions, 94 : 44 μ. Above the constriction are to be found upon the semi-cell as many as three protuberances placed horizontaily. Above these there is a broader middle protuberance, which is flanked to right and left by a scrobicula—*Schmidle.* (Plate II.)

Hab.: Herston road, *W. J. Byram.*

E. ansatum, var. attenuatum, *W. Schmidle.* This is a new variety, of which Professor Schmidle gives the following description:—The cells are clearly larger than in the typical form; dimensions, 120 : 52 μ, the under corners somewhat more rounded. The semi-cells diminish from the broader base onwards in a concave curve relatively much more considerably towards the narrow, truncated vertex than all forms of the species known to me. Generally above the isthmus is to be found a middle protuberance, which is surrounded by three papillæ, one to the left, one to the right, and one above. (Plate II.)

Hab.: Both forms occur mixed in the material from Herston road, Brisbane, collected by *Mr. W. J. Byram,* without it being possible to detect the intermediate forms.—*Schmidle.*

E. rostratum, *Ralfs.*, β **præmorsum,** *Nordst.*

Form: semi-cells furnished with scrobiculæ below the apical notch. Length of cell, 58·5 μ; breadth, 34 μ; breadth of isthmus, 6·5 μ. Length of semi-cell, 27 μ; breadth, 32·5 μ; breadth of isthmus, 6·5 μ.—*Borge.* (Plate XIII.)

Hab.: Rockingham Bay, *J. Dallachy.*

Form: semi-cells not furnished with scrobiculæ; on the basal lobes no teeth observed; seen from the base semi-cells furnished on each side with a large truncated inflation. Length of cell, 61-62·5 μ; breadth, 36-38 μ; breadth of isthmus, 6·5-8·5 μ.—*Borge.* (Plate XIII.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.* Compare Schmidle Freshwater Algæ from Australia Flora 1896, p. 310.

E. divergens, *Josh.*, *β* **australianum,** *Borge* (n. var.) Lateral lobes furnished with a few teeth; semi-cells furnished above the isthmus with a ring of granules about 9 and within the ring 4 granules; seen from the vertex oblong, furnished with a granulated inflation on each side; in lateral view furnished on both sides with a large basal inflation. Length of cell, 47-49·5 *μ*; breadth, 39-43 *μ*; breadth of isthmus, 9-10·5 *μ*. (Plate XIII.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

E. spinulosum, *Delp.*, **var. ornatum,** *Borge* (n. var.). Var. semi-cells furnished with 4 rings of granules in the middle; polar lobe shortened. Length of cell, 53 *μ*; breadth, 52 *μ*; breadth of isthmus, 13 *μ*; length of semi-cell, 21 *μ*; breadth, 57 *μ*. (Plate XIII.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.* Between Norman and Gilbert Rivers, *T. Gulliver.*

Partly by the armament of the cell membrane, partly by the very shortened end-lobes, which only extend to the same height as the intermediate lobes this form presents a very variable appearance. It is nearly allied to certain forms of *E. verrucosum*, Ehrenb; compare *E. verrucosum, b Wallichianum*, Turner, Algæ of East India, plate 74, Plate, XI., fig. 9.—*Borge.*

E. spinulosum, *Delp.*, **var. inermius,** *Nordst.* Length of cell, 57-53—semic. 27-(semic.) 30 *μ*; breadth of cell, 52-49—semic. 48-(semic.) 52 *μ*; breadth of isthmus, 12-12—semic. 12-(semic.) 10·5 *μ*. (Plate IX.)

Hab.: Rockingham Bay, *J. Dallachy.*

E. binale (*Turp.*), *Ralfs.* Forma Ralfs' Brit Desm., Plate XIV., fig. 8*e*.

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

E. verrucosum, *Ehrenb.*, **var. Möbii,** n. var. (*E. verrucosum*, f. Möb.) Australian Freshwater Algæ II., p. 340, Plate II., fig 21. Var. polar lobe strongly dilated, at the apex slightly emarginate; lateral lobules short; granules in the centre of the semi-cell large. Semi-cells seen from the vertex undulated on both sides; polar lobe and upper lateral lobules bifid at each apex. Length of cell, 95·5 *μ*; breadth, 88-89 *μ*; breadth of isthmus, 30 *μ*. (Plate XIII.)

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

The form observed by me differs a little from Möbius' form; it is smaller. the base of the semi-cell is straighter, the granulation is a little different. According to Möbius also the inferior lateral lobules should be divided, which, however, is not at any rate the case in the specimens observed by me. The form recalls in front view certain forms of *Micrasterias Americana* (Ehrenb.), Kütz. Forma with superior lateral lobules, very small. Length of semi-cells 45·5 *u*, breadth, 78 *u*; breadth of isthmus, 36 *u*.—*Borge.* (Plate XIV.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

E. sp., *Borge.* With three-lobed semi-cells; lateral lobes two-lobed, lobules quadrangular; polar lobe three-lobed, lateral lobules triangular, polar lobe furnished with a deep notch. Membrane in the middle of the semi-cell furnished with 2 scrobiculæ. Semi-cells not seen from the vertex and from the side. Length of cell, 69-72 *μ*; breadth, 39-40 *μ*; breadth of isthmus, 8 *μ*.—*Borge.* (Plate XV.)

Hab.: Rockingham Bay, *J. Dallachy.*

E. sp., *Borge.* Of smaller size, slightly broader than long, median notch deep and wide; semi-cells three-lobed; lateral lobes drawn out, upper corners bidentate, inferior corners unidentate, furnished with 3 teeth below the apical margin; membrane of semi-cells furnished with 4 granules in the middle. Length of cell, 19·5-23 μ; breadth, 29-32 μ; breadth of isthmus, 6·5-9 μ. Semi-cells not seen from the vertex and side.—*Borge.* (Plate XIV.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

E. inermius (*Nordst.*), *Turner.* Algæ of East India, p. 86, Plate; X., fig. 51.—Dimensions 56 : 50 μ.—*Schmidle.*

Hab.: Herston road, *W. J. Byram*; rare.

E. cuneatum, var. solum, *Nordst.* Dimensions, 76: 31 μ.—*Schmidle.* (Plate IX.)

Hab.: Enoggera district; rare.

E. umbonatum (*West*) = **E. rostratum, subsp. umbonatum,** *West.* Algæ of Madagascar (*ub. sup.*), p. 51, Plate VI., fig. 16.

Hab.: Herston road, Brisbane, *W. J. Byram*; pretty rare.

Professor Schmidle adds the following note:—*E. umbonatum* is essentially distinct from *E. rostratum* in form of cell and granulation. The var. *præmorsum,* Nordst., Freshw. Algæ of New Zealand and Australia, p. 34, Plate 3, fig. 7, belongs to it, as well as the var *elegans,* West (*ubi. sup.*).

E. Turneri, *West.* Freshwater Algæ, W. Irel. p. 141.

Hab.: N.E. Australia, Whitewater, near Mt. Albion, *Ch. W. Birch.*

The specimens observed agree with Plate III., fig. 11 in Nordstedt's Freshwater Algæ of New Zealand. A measured specimen (from Mt. Albion) was 40 *u* long, 26 *u* broad; isthmus, 6·5 *u* broad.

E. compactum, *Wolle.* Very small, suborbicular, little longer than broad; semi-cell broad, transversely oval; apex a slight protuberance with a linear incision; two small prominences, one on each side of the apical projections. Diameter, 20-22 μ; length, 28 μ.—Wolle's Desmids of the U.S., 107, Plate XXVII., figs 28 and 29.

The following is Professor Schmidle's description:—Dimensions, 32 : 24 μ. The basal inflation of the semi-cell is in our specimens furnished with small granulæ arranged in a circle. Forms which very probably are to be classed with this, or which at all events are very nearly akin to it, are described by Turner in his Algæ of East India, p. 83, Plate XI., fig. 1, and Plate X., figs. 36 and 52, as *E. incurratum* and *annulatum* (see Plate V.). (Plate VII.)

Hab.: Herston road, Brisbane, *W. J. Byram*; rare.

STAURASTRUM, Meyen.

S. retusum, *Turner.* Algæ of East India, p. 104, Plate XIII., fig. 13.

S. retusum, var. granulatum, *Borge* (n. var.). (Plate XIII.) Smaller variety, slightly broader than long, with straight back, not hollowed; membrane furnished with smaller granules. Length of cell, 15-16 μ; breadth, 19-20 μ.

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

The var. *punctulatum,* Eichl. and Gutw., Alg. nov., p. 13, Plate V., fig. 44, may be treated as a transitional form between this variety and the principal form. It has a partly punctate membrane, and a straight or an inappreciably concave apex.—*Borge.*

S. elegans, *Borge* (n. sp.). Large *Staurastrum* constricted on each side in the middle by a wide sinus, semi-cells gradually dilated upwards, apex slightly convex, corners furnished with greatly elongated very slender horns, which are finely denticulate at the margin and have a three-toothed apex; the inferior horns curved inwards, seen from the vertex quadrangular, hollowed at the sides. Membrane smooth. Length of cell without horns, 58-59 μ; with horns, 117 μ; breadth of cell with horns, 104 μ; breadth of isthmus, 15-16 μ.—*Borge.* (Plate XIV.)

Hab.: Between Norman and Gilbert Rivers, *T. Gulliver.*

S. bicorne, var. longebrachiatum, *Borge* (n. var.). Variation with sides of semi-cells furnished on each side with three denticulate processes; apex furnished with one series of processes, seen from the vertex semi-cells furnished with two rows of processes; rays longer, more slender, with bidentate apex. Membrane smooth. Length of cell, 33-34 μ; breadth with rays, 74-85 μ; breadth of isthmus 9 μ. (Plate XIV.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

I have after some reflection assigned this form to *S. bicorne;* it differs from this species by the sensibly longer and slender processes, by the protuberances in the sides of the semi-cells, and by the fact that it has only two rows of protuberances It recalls, however, in many respects *S. bicorne*, var. *Australis*, Rac. Desmidya Ciastoni, p. 22, Plate II., fig 8. Compare also *S. bengalense*, Turner, Algæ of East India, p. 124, Plate XIV., fig. 13. (Plate XVII.)—*Borge.*

S. rectangulare, *Borge* (n. spec.). Of moderate size, as long again as broad, moderately constricted in the middle; semi-cells with sides to some extent inflated, truncated at the apex, corners proceeding into arms; upright arms granulated; in vertical view semi-cells 3 cornered; sides hollowed. Length of cell with arms, 52 μ; greatest breadth, 26 μ; breadth of isthmus, 9-10 μ.—*Borge.* (Plate XVII.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

Compare *S. zonatum*, Börg., Desm. Bras., p. 951, Plate V., fig. 48, and *S. Maskelii*, Turner, Algæ of East India, p. 131, Plate XVI., fig 21.

S. orbiculare, *Ralfs.* Segment smooth, semi-orbicular; end view bluntly triangular. Zygospore orbicular, beset with subulate spines. Size: 28 μ; diameter, 25 μ (D.); diameter, 30-45 μ (WO.); diameter, 22-50 μ (K.); length, 32 μ; diameter, 27 μ (N.).—Cooke's British Desmids, 156. (Plate VIII.)

S. orbiculare, β **depressum,** *Royet Bisset.* Japanese Desmids, Plate 269, fig. 14, and Racib. (*ubi. sup.*), Plate II., fig. 17.

Hab.: Jenkins' Quarry, Bundamba, and Blackstone, Ipswich, *W. J. Byram.*

S. orbiculare, β **denticulatum,** *Nordst.*

Hab.: Rockingham Bay, *J. Dallachy;* between Norman and Gilbert Rivers, *T. Gulliver.*

S. pygmæum, *Bréb.* Segments in front view cuneiform, outer margin slightly convex, smooth, end view with three blunt angles, sides slightly convex, zygospore orbicular, beset with protuberances, bearing each two bifurcate spines at their summits. Size: Length, 32-34 μ; diameter, 27-34 μ (Witt.), 40 x 38 μ (N.).—Cooke's British Desmids, 157. (Plate XI.)

S. pygmæum, var. obtusum, *Wille.* Nov. Seml., Plate XIII., fig. 56, p. 51.

Hab.: Herston road, Brisbane, *W. J. Byram;* rare.

S. Bieneanum, var. ellipticum, *Wille* (*ubi. sup.*), Plate XIII., fig. 47. Semi-cells elliptic; end view triangular with angles rounded, sides more or less deeply concave; membrane finely punctate, distinctly observable when the cell is empty; punctules regularly arranged in transverse lines. Diameter, 33-38 μ.—Wolle's Desmids of the U. S., 137. (Plate VII.)

Hab.: Jenkins' Quarry, Bundamba, *W. J. Byram;* rare.

S. dilatatum, *Ehrb.*, **forma australica,** *W. Schmidle.* Professor Schmidle says:—The cells are scarcely diminished towards the lateral corners. The vertical view is triangular or quadrangular, with concave sides and rounded corners. Dimensions, 24 : 26 μ. (Plate II.)

Hab.: Jenkins' Quarry, Bundamba, and Blackstone, Ipswich, *W. J. Byram;* rare.

S. paradoxum, *Meyen.* Frond rough; front view with elongated diverging processes, which are minutely trifid at the apex; end view quadrangular, or sometimes triangular. Size: Length, 72 μ; diameter, 50 μ (D.); diameter, 40-60 μ (K.); diameter, 40-60 μ (Wo.).—Cooke's British Desmids 171. (Plate XI.)

Hab.: Herston road, *W. J. Byram;* rare.

S. subpinnatum, *W. Schmidle.* Professor Schmidle says:—"This interesting species seems at first sight very similar to *St. pinnatum*, Turner, Algæ of East India, p. 115, Plate XIII., figs. 27 and 29, especially to the var. *simplex*, Turner (*ubi. sup.*). It differs, however, (1) in having only above at the base of each of the six radial arms short truncated protuberances placed two and two together; (2) in having upon the truncated vertex within the circle of the twelve protuberances a second circle of very fine granulæ; (3) in having the cell quite smooth, with the exception of one horizontal circle on each side of the slight middle construction. Dimensions, 40 : 52 μ (with the arms)." (Plate II.)

Hab.: Blackstone, Ipswich, *W. J. Byram.*

S. gracile, *Ralfs.* Segments rough, elongated on each side into a slender process, which is terminated by minute spines; end view triradiate. Size: Length, 72 μ; diameter, 50 μ (D.); length, 42 μ; diameter, 55-60 μ (K.); diameter, 40-50 μ (Wo.).—Cooke's British Desmids, 170. (Plate XI.)

S. gracile, var. uniseriatum, *West.* Algæ of Madagascar, Plate 9, fig. 3, page, 77. Professor Schmidle's note is—"The breadth of the cell with the prolongations amounts to barely 32 μ." (Plate IX)

Hab.: Herston road, Brisbane, *W. J. Byram;* rare.

S. sexangulare, *Lund.* Middle size or larger, constricted with a broad acute-angled sinus; semi-cells more or less depres-edly globose, dorsal margin truncate, ventral convex, lateral processes in pairs (rarely three), divergent, deeply cut, broadly protracted, processes elongated, colourless, margin delicately 3-4-toothed, apice 3-4-fid, end

view 4-7 sided, angles a little protracted, elongated into two (rarely three) rays, margin denticulate, ends 3-4-fid, deeply incised, inner angles retuse, ornamented with a row of granules within the margin. Size: Length, 44-60 μ, with rays 100 μ; diameter, 28-43, with rays 90-116 μ; longest rays, 32 μ (L.), 100 x 45-54 μ (C.).—Cooke's British Desmids, 178. (Plate XI.)

S. sexangulare, forma australica, *W. Schmidle*. Professor Schmidle says—"The form almost attains in its dimensions the typical form, Lundels; it is less prolonged at the apex than the var. *productum*, Nordst. The prolongations of the vertex directed upward are very short, badly developed, and like the long lateral prolongations almost smooth. The apex within the prolongations is finely and irregularly granulated. Our form generally resembles the form of the var. *productum*, Nordst., from Sydney, described by Racib. (*ubi. sup.*), page 31, from which it differs, however, in dimensions, in the granulation of the vertex, and the shorter prolongations directed upwards."—*Schmidle*. (Plate II.)

Hab.: With the foregoing, *W. J. Byram;* rare,

S. sexangulare, var. incurvum, *Börge* (n. var.). Variation smaller than the typical form, back of the semi-cells convexly rounded, superior rays ascending, margin furnished with a single tooth, inferior rays curved inwards. In vertical view quadrangular. Length of semi-cell without rays, 18-19 μ; with rays, 32-33 μ; breadth of cell without rays, 28-29 μ; with rays, 57-58 μ.—*Borge*. (Plate XIV.)

Hab.: Rockingham Bay, *J. Dallachy*.

XANTHIDIUM, Ehrenb.

X. bifurcatum, *Börge* (n. spec.). Very large Xanthidium, sinus widened outwards; semi-cells three-lobed; polar lobe attenuated above; apex truncate or very slightly concave, corners furnished with a firm process, and with a pair of processes below the apical margin; lateral lobes provided with a pair of processes and within these with a single process; membrane further furnished with a single process in the middle above the isthmus and above that with a pair of processes; all the processes bifurcate, with three-toothed apices. In vertical view semi-cells elliptical, apices furnished with three processes and a single process (or a pair of processes) on each side. Zygotes very large, provided with long trifurcate spurs. Length of semi-cell, with processes, 107-117-123·5 μ; breadth of semi-cell, with processes, 143-149·5-169 μ; breadth of isthmus, 34 μ.—*Borge*. (Plate XIV.)

Hab.: Johnstone River, *Dr. Thos. L. Bancroft*.

A very striking species, nearly related to *X. armatum*, Bréb. Whether in vertical view one or two processes are seen depends, of course, on the focussing. The Fig. 24*c* is drawn in an oblique position. All the zygotes which I have observed were either burst or more or less obscured by other circumstances, on which account I can furnish neither dimensions nor a complete figure. The figure given, however, may supply a sufficiently good representation of the appearance and dimensions of the zygotes.—*Borge*.

X. multicorne, *Börge* (n. spec.). Deeply constricted in the middle; sinus widened at the extremity; semi-cells somewhat reniform, convex in the back; in vertical view elliptical, in lateral view circular. Membrane of semi-cells furnished with 14 hooked horns

arranged in two rows (7 x 7), the remainder smooth. Length of cell, 59-60 μ; breadth, 46-47 μ; breadth of isthmus, 14 μ. — *Borge.* (Plate XIV.)

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

Resembles very much *X. acanthophorum*, Nordst.; differs, however, from that species in the longer curved spines, which are hook-shaped and arranged in a different order.—*Borge.*

X. superbum, *Elfv.* Form with sinus sharp, not straight; semi-cells on each side furnished with 5 very slightly-curved spurs and having 2 warts at the apex. Membrane in the middle usually brown and scrobiculate. Length of cell with spurs, 91 μ; breadth with spurs, 65 μ; breadth of isthmus, 16-17 μ. (Plate XV.)

Hab.: Rockingham Bay, *J. Dallachy.*

X. fasciculatum, *Ehrenb.*

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft;* Rockingham Bay, *J. Dallachy.*

X. octonarium, *Nordst.* Freshwater Algæ of New Zealand and Australia, p. 42, Plate IV., fig. 22. Very rare. (Plate III.)

Hab.: Herston road, Brisbane, *W. J. Byram.* The alga has probably never been seen elsewhere than by Nordstedt from New Zealand.

ARTHRODESMUS, Ehrenb.

A. convergens, *Ehrenb.*

Hab.: Rockingham Bay, *J. Dallachy;* Port Denison.

A. convergens, var. mucronatus, *Börge* (n. var.). Variation with apex furnished with a sharp point a little below the margin; sinus soon greatly dilated; in vertical view semi-cells almost rhomboidal. Length of cell, 31 μ; breadth, 45-46 μ; breadth of isthmus, 9 μ.—*Borge.* (Plate XIV.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

A. apiculatus, *Josh.* Form with sinus soon greatly widened; back less curved than the semi-cells; in front view inflated on each side. Length of cell, 33-34 μ; breadth, 32-33 μ; breadth of isthmus, 9 μ. (Plate XIV.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

COSMARIUM, Corda.

C. tesselatum, Nordstedtii, *Möb.* Australian Freshwater Algæ, p. 443, fig. 16. Length of cell, 79-84·5-91 μ; breadth of cell, 48-51-58·5 μ; breadth of isthmus, 32·5-32·5-36 μ.

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft;* Rockingham Bay, *J. Dallachy.*

C. cylindricum, *Ralfs.*

Hab.: Rockingham Bay, *J. Dallachy.*

C. excavatum, *Nordst.* Larger form, more excavated. Length of cell, 38-42 μ; breadth, 22-23·5 μ; breadth of isthmus, 9-11 μ. (Plate XV.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

Form, Nordst. Freshwater Algæ of New Zealand, page 52, Plate V., fig. 18, but smaller. Length of cell, 27-8 μ; breadth, 17 μ; breadth of isthmus, 9 μ. (Plate XVII.)

Hab.: Rockingham Bay, *J. Dallachy*.

Form, Nordst., *l.c.*, but much larger. Length of cell, 45-46 μ; breadth, 28-29 μ; breadth of isthmus, 11-12 μ. (Plate XV.)

Hab.: Rockingham Bay, *J. Dallachy*.

C. tetraopthalmum (*Kütz*), *Breb.*

Hab.: Mitchell River, near the Gulf of Carpentaria, *Edw. Palmer*.

C. Brebissonii, *Menegh.*

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft*.

C. denticulatum, *Borge* (n. spec.). Very large, 1½ as long as its diameter, middle deeply constricted, suture almost straight, widened at the extremity; semi-cells circular-pyramidal, lower corners and apex rounded, membrane densely denticulate towards the sides and apex with teeth arranged concentrically; punctulate below, scrobiculate in the middle, furnished above the isthmus with one series of teeth; in vertical view semi-cells elliptical, membrane towards the sides and apices densely denticulate, punctulate below, scrobiculate in the middle; in lateral view somewhat oval, membrane punctulate towards the sides, the remainder densely denticulate. Length of semi-cell with teeth, 84·5-91—(cell) 182 μ; breadth of semi-cell with teeth, 126-130—(cell) 133 μ; breadth of isthmus, 45·5-45·5 μ.—*Borge*. (Plate XV.)

Hab.: Johnstone River, *Dr. Thos. L. Bancroft*. Compare *C. Eloiseanum*, Wolle.

C. securiforme, *Börge* (n. spec.). Large Closterium, deeply constricted in the middle, suture with sharp angles, not greatly widened. Semi-cells with straight diverging sides, apex broadly rounded; apices of the semi-cells furnished with 3 curved marginal spurs, and a little above them with one spur; membrane densely scrobiculate, thickened in the middle and often brown; in vertical view with rhomboidal truncated sides, apices denticulate. Length of semi-cell, 65 μ; breadth with spurs, 131-132 μ; breadth of isthmus, 36-37 μ.—*Borge*. (Plate XV.)

Hab.: Between the Norman and Gilbert Rivers, *T. Gulliver*.

C. reniforme (*Ralfs*), *Arch.*

Hab.: Waters of Gulf country, *Dr. Thos. L. Bancroft*.

? C. pseudobroomei, *Wolle*. Form a little broader than long; semi-cells with upper and lower corners rounded. In vertical view semi-cells as in Plate LI., fig. 36, Wolle Desm. United States. Length of cell, 43-45·5 μ; breadth, 45·5-48 μ; breadth of isthmus, 14-16 μ. (Plate XV.)

Hab.: Johnstone River, *Dr. Thos. L. Bancroft*.

Dr. Borge says:—I have, after great consideration, assigned this form to *C. pseudobroomei*, Wolle, though in front view it does not agree with Wolle's figure; on the other hand it agrees very well with fig. 6A, Plate XVI., in Ralfs Brit. Desm. Wolle says of *C. pseudobroomei* in Desm. United States, p. 86: "This new species is in all its details of structure like the preceding (*C. Broomei*), but entirely devoid of a central inflation." If this were correct, I would, without hesitation, assign the form observed by me to *C. pseudobroomei*. If, however, Wolle's figure is compared

with that given by Ralfs, the agreement is not so complete. A nearly allied species is *C. creperum*, West, Freshwater Alg. of Madagascar, p 63, Plate VII., fig 11, which, however, deviates in having different dimensions and granules differently arranged and more widely separated from each other. Compare also *C. quadrum*, var. *minus forma*, Schmidle, Freshwater Algæ of Australia, p. 309, fig. 14. See Plate II.

C. orthostichum, *Lund.*

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

C. Askenasyi, *Schmidle.* Alg. Sumatr., p. 304, Plate IV., fig. 7. Smaller form with median suture afterwards widened; apex of semi-cells truncated. Length of semi-cells, 65 μ; breadth, 91 μ; breadth of isthmus, 36-37 μ. (Plate XV.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

Smaller form, median suture afterwards widened; semi-cells seen from the front with opening of the isthmus rounded towards the sides, truncated at the apices. Length of cell, 137-138 μ; breadth, 111-112 μ; breadth of isthmus, 45·5 μ. (Plate XV.)

Hab.: Rockingham Bay, *J. Dallachy.*

In all the specimens belonging to these two forms which I have observed, the membrane was finely punctate; on the other hand the horizontal row of stronger points which are to be found at the isthmus, and which Schmidle observed in the Sumatra form. To this species may, perhaps, be assigned as a variety *Cosmarium spec*, Möb., Austr. Freshwater Alg. II., p. 340, Plate II., fig. 20.—*Schmidle.*

C. De Baryi, *Arch.*, Form, Nordst., Desm. Arct. p. 29, Plate VII., fig. 27. Length of cell, 138-159 μ; breadth, 69-72 μ; breadth of isthmus, 35-36 μ.

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

The form therefore differs a little from Nordstedt's form in being proportionately slenderer, and having a smaller isthmus.

C. turgidum (*Bréb.*), *Lund.* (Plate III.)

Hab.: Rockingham Bay, *J. Dallachy.*

C. pachydermum, *Lund.* Smaller form. Length of cell, 72-73 μ; breadth, 56 μ; breadth of isthmus, 27-28 μ. (Plate III.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

C. ellipsoideum, *Elfv.* Smaller form. Length of cell, 24-26 μ; breadth, 21-22 μ; breadth of isthmus, 4·5-5 μ.

Hab.: Port Denison.

C. obsoletum (*Hantzech*), *Renisch.* Length of cell, 51-52-52 μ; breadth of cell, 52-58·5-58·5 μ; breadth of isthmus, 32·5-26-30 μ. (Plate III.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft*; Port Denison, Rockingham Bay, *J. Dallachy.*

C. pseudoprotuberans, *Kirchn.* Smaller form. Length of cell, 24-25 μ; breadth, 21 μ; breadth of isthmus, 6·5 μ.

Hab.: Queensland, Gulf of Carpentaria, *Dr. Thos. L. Bancroft.*

Larger form with upper corners of the semi-cells almost rounded: back higher; in vertical view semi-cells inflated on each side. Length of cell, 44 μ; breadth, 39 μ; breadth of isthmus, 11-12 μ. (Plate XV.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

C. Meneghinii, *Bréb.* Form agreeing with *C. impressulo*, Elfv.

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

C. trachypleurum, *Lund.*, var. minor, *Rac.*

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

C. binum, *Nordst.*, **var. australiensis,** *Borge* (n. var.). Variation about twice as long as broad; sides of semi-cells almost parallel; upper corners rounded; notches about 20; median granules distributed in 5 vows and below one horizontal row of 5 granules; membrane granulated towards the margin, granules distributed singly in one interior series and in pairs in two exterior series. Length of semi-cell, 21-22 μ; breadth, 28-29 μ; breadth of isthmus, 11 μ.—*Borge.* (Plate XV.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.* May perhaps be assigned to *C. binum*, var., Rac. Non. Desm., p. 21, Plate V., fig. 25.

C. phaseolus, *Breb.*, β **elevatum,** *Nordst.* Smaller form. Length, 19-20 μ; breadth, 18 μ; breadth of isthmus, 5·5 μ.

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

C. angustatum (*Wittr.*), *Nordst.* Form with semi-cells gradually attenuated from the base. Length of cell, 27-28 μ; breadth, 17 μ; breadth of isthmus, 4 μ. (Plate XVI.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

It is not without consideration that I have assigned this form to *C. angustatum*; in the principal form the vertex is more depressed; a form which seems somewhat more nearly allied to that described by me is *f. australis*, Rac. Desmidya Ciastoni, p. 366, Plate VII., fig. 29.

C. dubium, *Borge* (n. spec.). Small *Cosmarium* twice as long as broad, almost rectangular, sinus straight and narrow; semi-cells with 4 undulations; sides almost straight; inferior corners somewhat straight; apex very slightly emarginate; in vertical view oval, furnished with an inflation on each side; the rest of the margin undulate. Length of cell, 30 μ; breadth, 20-21 μ; breadth of isthmus, 5 μ.—*Borge.* (Plate XV.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

C. granatum, *Breb.* Dimensions, 32-20 μ.

Hab.: Enoggera District; Blackstone, Ipswich; and Jenkins' Quarry, Bundamba, *W. J. Byram;* waters of the Gulf country, *Dr. Thos. L. Bancroft;* Rockingham Bay, *J. Dallachy.*

C. granatum, var. gibbosum, *W. Schmidle* (n. var.). Professor Schmidle says:—"The cell-dimensions are 38 : 25-28 μ. The semi-cells are slightly rounded at the vertex, and have regularly a cell-membrane thickened inwards. The latter is covered all over with broad very slightly raised elevations. The appearance from the vertex is that of a narrow ellipse, with almost parallel sides." (Plate II.)

Hab.: Blackstone, Ipswich, *W. J. Byram.* The form recalls in some respects *C. supergranatum*, Turner, *f. punctata*, Turner, Algæ of the East Indies, Plate VIII., fig. 38, p. 57; Plate II., figs. 8*a* and *b*. For comparison Turner's figure is copied in Plate III., fig. 5.

Form, Schmidle (*Borge*), Alg. ans Denver, fig. 1, and Borge Subfoss Sötv. Alg. Gotl., fig. 1-3; membrane smooth. Length of cell, 25-27 μ; breadth, 18-22 μ; breadth of isthmus, 5-6·5 μ.

Hab.: Mitchell River, near Gulf of Carpentaria, *Edwd. Palmer*. Frequently the two cell halves belonged to different forms.

C. Meneghinii, var. concinnum, *Rabh.* The following is Professor Schmidle's note:—"Dimensions, 24-20 μ. The upper corners cut off obliquely are slightly, hardly perceptibly, curved inwards." (Plate IX.)

Hab. with the foregoing: At Jenkins' Quarry, Bundamba, *W. J. Byram*, in the typical form.

C. crenulatum, *Næg.* Professor Schmidle says:—"The forms observed agree exactly with the figure in Naegeli; Eniz. Alg., Plate VIIA., fig. *7c*."

Hab.: Blackstone, Ipswich, *W. J. Byram*.

C. subtumidum, *Nordst.*

Hab.: Jenkins' Quarry, *W. J. Byram*; rare.

C. subtumidum forma. Professor Schmidle says:—"This form approximates to the form *rotunda* in Algenflora v. Virnheim, p. 52, fig. 14. The semi-cells are prolonged sideways almost into angles, so that the resemblance to *Cos. sexangulare*, Ld., is great. Dimensions, 32 : 28 μ." (Plate II.)

Hab.: Blackstone, Ipswich, *W. J. Byram*; very rare.

And he adds:—"If I have rightly understood the remarks of Börgesen, written in Danish in his Freshwater Algæ from East Greenland, 1894, p. 19, the form *rotundata* and others ought to be classed with *C. phaseolus*, Breb., as is already done by Klebs in Desm. East Prussia, p. 35. I cannot reconcile myself with classing together. *C. phaseolus*, Breb., is clearly inflated at the middle of the half-cells, *vide* Ralfs' British Desmids, p. 106, Plate XXXII., fig. 5*c*. The specimens figured by Klebs (above work, Plate III., figs. 41 and 42) do not therefore belong to *C. phaseolus*, Breb., as Gutwinski also states in Flora Glonow Galicyi, p. 22. Gutwinski, therefore, created for such forms the species *C. Klebsii*, which I have recently found pretty abundantly near Freiburg. Yet this species differing from our specimens has a granulated membrane I have now found the form *rotundata* in Virnheim under the typical *C. subtumidum*, Nordst. According to shape of cell, dimensions, condition of the membrane, &c., it is nearly related to it, and is therefore scarcely ever better classed elsewhere. *C. phaseolus*, Breb., var. *achondrum*, Boldt., has nothing to do with *C. phaseolus*, from which it is distinguished by very much larger dimensions as well as absence of the inflation."

C. nitidulum, *De Not.* Cells small, smooth, of nearly equal length and breadth; constriction deep, sinuses narrow linear; basal angles of semi-cells obtusely rounded, sides rounded, ends roundly truncate; viewed from the vertex elliptic; from the side, subovate. Diameter, 22-30 μ; length, 25-35 μ.—Wolle's Desmids of the U. S., *72a*. (Plate V.)

Hab.: Blackstone, Ipswich, *W. J. Byram*; rare.

C. moniliforme (*Turp.*), *Ralfs*, **forma.** Cells twice as long as wide; semi-cells spherical, united by a narrow isthmus; four semi-cells often in series; cell membrane smooth. Diameter, 16-24 μ.—Wolle's Desmids of the U. S., 65. (Plate VII.)

The following is the note of Professor Schmidle:—"Dimensions 48 : 28 μ. According to the form of the cell our specimens may, perhaps, be classed with the form *elliptica*, Lagerh., Desmids of America Fl, Plate XXVII., fig. 13. It is, however, somewhat larger, more strongly constricted, and has almost spherical semi-cells. The vertical view is broadly elliptical, the thickness 24 μ."

Hab.: Jenkins' Quarry, near Bundamba, *W. J. Byram.* (Plate II.)

C. minutum, forma. Professor Schmidle says:—"The cells agree well in their shape with *C. minutum f. novizelandica*, Nordst., yet the cell-membrane is strongly punctate, almost granular, like that in *C. ellipsoideum*, var. *notatum* (from Sydney) in Raciborski Desmids (*ubi. sup.*), p 13. Dimensions, 29 : 21 μ." (Plate IV.)

Hab.: Herston road, Brisbane, *W. J. Byram.* For Nordstedt's figure see Plate IV.

C. venustum, *Breb.* Length of cell equal to about 1½ diameters; constriction deep; sinus narrow linear; semi-cells have a flat base, rounded lower angles, sides somewhat convergent, each with two notches of equal size; ends truncate, and slightly retuse. One cholorophyl mass in each semi-cell; membrane smooth. Diameter, 24-30 μ. (Plate V.)

Form, *Borge*, with semi-cells gradually attenuated from the base, apex slightly concave, membrane furnished with scrobicula above the middle. Length of cell, 39-40·5 μ; breadth, 26-27 μ; breadth of isthmus, 5-6·5 μ. (Plate XV.)

Hab.: Rockingham Bay, *J. Dallachy.* Possibly this form is identical with *C. cambricum*, Wills, which is classified by Roy and Bisset in Scott. Desm., p. 48, as synonymous with *C. venustum.*

C. venustum (*Breb.*), *Arch.*, **f. minor,** *Wille.* Nov. Seml., p. 43. Professor Schmidle says:—"The dimensions are barely 18 : 12 μ (In Wille 24 : 18 μ; in West, Ireland, 21 : 16 μ). The side lobes are hardly perceptibly inflated at the margins."

Hab.: Blackstone, Ipswich, *W. J. Byram;* rare.

C. venustum, var. hypohexagonum, *West.* Ireland, p. 147, Plate XXI., fig. 1.

Hab.: Herston road, Brisbane, *W. J. Byram;* somewhat abundant.

C. hexagonum, *Elf.*

Hab.: Blackstone, Ipswich, *W. J. Byram;* rare.

C. obsoletum, var. punctatum, *Mask.* The following is Professor Schmidle's note:—"Dimensions, 56 : 56 μ. The corners were sometimes furnished with spines on the under portion, sometimes prolonged into sharp points. A portion of the specimens would therefore, according to Turner (Freshwater Algæ of East India), have to be classed with *C. palustre*, Turner. (Plate III.)

Hab.: Blackstone, Ipswich, *W. J. Byram;* fairly abundant.

The following descriptions of and remarks relating to *C. obsoletum, forma major*, and of *C. palustre* are taken from Turner's Freshwater Algæ of East India, pp. 60 and 61. **(Plate III.)**

C. obsoletum, forma major. Long. et lat. 64, lat. isth. 27μ. This form agrees perfectly with those of Germany and Sweden. Lundell (Desm. Luec., p. 38) says of the basal angles, "modo non modo minus distincte acuminati sunt," and it is to be noted that he does not use the term "aculeati"; this testimony, and Reinsch's figure, apparently exclude the basally dentiferous forms usually placed under this species. (Plate III.)

Hab : Blackstone, Ipswich, *W. J. Byram.*

C. palustre, *Turn.*; α, **circulare,** β, **ovale.** (*a*) α, *circulare f. major*, long. 65, lat. 65, lat. isth. 31μ; (*b*) *circulare, f. minor*, long. 56, lat. 54, lat. isth. 22μ; (*c*) *ovale*, long. 68, lat. 78, lat. isth. 37μ. Also in Wallich: "Endochrome collected into 2 irregular patches in each segment." These forms in front view are much like *C. Smolandicum*, Lundell (*l.c.*, p. 38, Pl. II., fig. 17), but the vertical view is more acuminate and the lateral view not so deeply constricted as in Lundell's species. The form (*b*), *supra*, is either smooth or delicately punctate; (*c*) shows the mucous investment; this fig. is after Wallich. I certainly hold the opinion that these forms should not continue under *C. obsoletum*, as the basal angles are aculeate, not acuminate. (Plate III.)

Hab.: Blackstone, Ipswich, *W. J. Byram.*

C. pachydermum, *Lund.* Large, a third part longer than broad, deeply constricted, with a narrow linear sinus; semi-cells semi-circular, forming two-thirds of a circle, lower angles rounded; end view oval; side view elliptically orbicular, cell-membrane thick, distinctly but densely punctate. Amylaceous granules two. Size: Length, 105-117 μ; diam. 80-87 μ (L.); diam. 75-100 μ (W.).—Cooke's British Desmids, 85. (Plate IX.)

Hab.: Blackstone, Ipswich, *W. J. Byram*; rare.

C. angulatum (*Perty*) *Rabh.* Fl. Eup. Alg., p. 167.

C. angulatum, f. major, *Grunow.* Turner Alg. East India, Plate VIII., fig. 35. The cells are somewhat broader; dimensions 67: 42 μ.—*Schmidle.* (Plate V.)

Hab.: Blackstone, Ipswich, *W. J. Byram.*

The following is taken from Turner's work:—Long. 58-67, lat. 29-37, lat. isth. 16-18, crass. 23 *u*. Grunow gives: Long. 62, lat. 40, lat. isth 18 *u* (*a*). Long 59, lat. 40, lat. isth. 16 *u* (*b*.)

For the type Perty's dimensions are:—Long. 41, lat. 29, lat. isth. 16 *u*.

Wallich says:—"In some matured specimens the endochrome was in large granular masses, measuring from 2·2 to 6·7 *u* in length and 2·2 to 4·5 *u* in breadth. arranged in radii from a central point." Whether this be correct or not, the specimen from which I figured f. 35 (reproduced Plate V.) had remnants of endochrome showing two pyrenoids in each semi-cell as depicted. Wallich states that the ends are somewhat rounded; in my specimens one had straight the others slightly incurved apices. The frond is smooth. (Plate V.)

C. Reinschii, *Arch.* Frond truncate, ellipitical, nearly one-fourth longer than broad; constriction linear; segments ovate or semi-elliptic; ends straight, smooth; sides with three projecting nodules; end view elliptic, swollen in the middle. Size: Length, 33 μ; diam. 28 μ (Re.); diam. 30-35 μ (W.).—Cooke's British Desmids, 96. (Plate IX.)

Hab.: Jenkins' Quarry, Bundamba, *W. J. Byram*; rare.

C. Regnesii, *Reinsch.* Small. Cells in front view rectangular, with a medium semi-elliptic incision on each side; semi-cells in front view trapezoid, denticulate at the margin, with eight equi-distant teeth; membrane smooth. Size: Length, 11-13 μ; diam. 11-13 μ (Re.).—Cooke's Brit. Des., p. 95. (Plate IX.)

C. Regnesii, var. montanum, *W. Schmidle.* Further contributions, &c. Plate I., Fig. 9.

Hab.: Herston road, Brisbane, *W. J. Byram*; rare.

Professor Schmidle adds:—"West has described in his Algæ of Madagascar (Lin. Soc. of London, October, 1895) a *C. pseudoregnesii*, p. 59, Plate VI., figs. 42 and 43, which I consider to be identical with our variety. As my work had already appeared in Hedwigia in April, 1895, my nomenclature has priority. Should the alga be included in the separate species it must therefore be called *C. montanum*."

C. punctulatum, *Breb.* Frond, about as long as broad, constriction linear, segments subreniform, clad with small scattered granules, or sometimes punctate; end views elliptic; zygospore orbicular, elegantly beset with rather short and thick processes, which are rounded above and margined by a number of very short, acute spinelets, with a central slender elongate, slightly tapering, process, bifid or trifid at the extremity. Size: Length 22-30 μ; diam. 22 μ (M.); length 24-31 μ; diam. 21-26 μ (Wille); diam. 20-30 μ (Wo.).—Cooke's British Desmids, 104. (Plate IX.)

C. punctulatum, f. typica. Professor Schmidle says:—"The cells are all over symmetrically punctate."

Hab.: Jenkins' Quarry, Bundamba, *W. J. Byram.*

C. punctulatum, forma. Professor Schmidle says:—"The cells exhibit on the semi-cell above the isthmus in front view arranged in a circle small granules as was shown by me in Hedwigia, 1893, Part 3, p. 7, or by Börgesen in Freshw. Algæ East Greenland, Plate I., fig. 3. The vertical view is elliptical not inflated."

Hab.: Blackstone, Ipswich, *W. J. Byram*; rare.

C. punctulatum, forma. Professor Schmidle says:—"The somewhat smaller dimensions of the cell amount to about 26 : 23 μ. The semi-cells are granulated at the margin as in the foregoing form, and in the middle in horizontal rows becoming continually broader as they proceed upwards; vertical view elliptical." (Plate II.)

Hab.: Jenkins' Quarry, Bundamba, *W. J. Byram.*

C. crenatum, *Ralfs.* The following is Professor Schmidle's note:—"Dimensions barely 18 : 16 μ. The form of the cell is like that in Turner Algæ of East India, p. 50, Plate VII., fig. 28." (Plate IV.)

Hab.: Blackstone, Ipswich, *W. J. Byram*; rare.

The following is taken from Turner (*l.c.*):—*C. crenatum, f. minuta.* Formæ typical consimile sed minus. Long. 15, lat 13, lat. isth 5 *u.*

C. Portianum, *Ach.* Frond about one-third longer than broad, constriction deep, wide, somewhat round below; isthmus forming a short neck; segments elliptical, rough all over with minute scattered pearly granules; end view elliptic. Zygospore orbicular, beset with

somewhat elongated conical blunt spines. Size: Length, 40 μ; diameter, 25 μ (A.); diameter, 25-33 μ (Wo.); length, 40 μ; diameter, 30 μ (C.).—Cooke's British Desmids, 103. (Plates IV. and VII.)

Hab.: Jenkins' Quarry, Bundamba, *W. J. Byram;* waters of the Gulf Country, *Dr. Thos. L. Bancroft.*

C. Blytii, *Wille.* Small, somewhat longer than broad; semi-cells subreniform, apex truncate with four crenulations; sides erose-crenate (crenæ three); semi-cells within the margin granulate, granules arranged in two series of about fourteen and nine; in centre a small prominence. Lateral view circular with a papilla on each side; end view elliptic, with a prominence of papilla on each side. Diameter, 14-15 μ; length, 17-18 μ.—Wolle's Desmids of the U. S., 95. (Plate VII.)

C. Blytii, f. australica, *W. Schmidle.* Professor Schmidle gives the following description of this new form:—"The dimensions are 23 : 20 μ. The shape of the cell agrees well with Nordstedt's Greenland form (Nordst. Desm. Greenland, Plate VII., fig. 4.) The margin is somewhat more granulated, and towards the apex of the half-cell there are to be found in the middle two considerable (rarely only one) protuberances placed horizontally." (Plate II.)

Hab.: Jenkins' Quarry, Bundamba, *W. J. Byram;* rare.

C. botrytis, *Meneg.* Frond rather longer than broad, constriction deep, linear; segments twice as broad as long, broadest at the base, narrowing upwards; sides rather rounded, ends truncate, rough all over with scattered rounded pearly granules; end view broadly elliptic; zygospore orbicular, spinous, spines elongated and slightly divided at the apex. Size: Length, 72 μ; diameter, 57 μ (D.); diameter, 35-62 μ (Wo.); length, 85 μ; diameter, 65 μ; length, 68 μ; diameter, 52 μ (C.)—Cooke's British Desmids, 105. (Plate VII.)

C. botrytis, var. tumidum, *Wittr.* Dimensions, 48 : 43 μ.

Hab.: Jenkins' Quarry, Bundamba, *W. J. Byram.*

C. Neapolitanum (*Balsamo*), **var. australicum,** *W. Schmidle.* Professor Schmidle says:—"The cells are broader than long; dimensions 36 : 48 μ; rectangular with rounded corners, and with a membrane granulated in perpendicular rows. The constriction in the middle is deep, narrow, and straight; the semi-cells widen upwards, often with even, often with convex margin. In each semi-cell are two pyrenoids. The vertical view is a narrow ellipse, with almost parallel sides, and in its middle now and then indistinctly broadly inflated." (Plate II.)

Hab: Herston road, Brisbane. *W. J. Byram.* Turner describes a very kindred but longer form in his Algæ of East India, p. 72, Plate XXIII., fig. 10.

The following is Turner's note referred to by Dr. Schmidle:—"*C. sp.* Long. 44, lat. 42 *u*. Probably a variety of *Cos. Neapolitanum*, Balsamo, but with the superior angles more rounded; the granules on the cytioderm are vertically arranged. (Plate IV.)"

C. quadrum, *Lundell.* Rather large, about as long as broad, deeply constricted, with a narrow linear sinus, rather quadrate, apex very slightly retuse, sides almost straight, angles very broadly rounded, in side views each pole is rounded, and the middle broadly

excavated, semi-cells with straight continuous base, lower angles rectangular, lateral margin crenate, dorsal margin densely crenulate, end view oblong. Membrane densely warted, warts in quincuncial order (about 17 longitudinal rows). Size: Length, 73-78 μ; diameter, 70-72 μ (L); length, 78 μ; diameter, 62 μ (C.).—Cooke's British Desmids, 102. (Plate IX.)

C. quadrum, var. minus, *Nordst.*, **forma?** The following is Professor Schmidle's note:—"Dimensions, 48 : 46 μ; the granules form a quincunx; the upper corners are considerably rounded; two pyrenoids in the semi-cell; the vertical view is not inflated." (Plate II.)

Hab.: Blackstone, Ipswich, *W. J. Byram.* Perhaps also our form may be classed with *Cos. pseudobromei*, var. *elegans*, West, Algæ of Madagascar, p. 62, Plate VI., fig. 25.

C. amplum, *Nordst.* Alg. of N. Zeal., p. 63, Plate 6, fig. 20. Professor Schmidle says:—"The semi-cells of our form are generally somewhat broader at the base and the under corners are less rounded. They have, therefore, generally a somewhat more semi-circular shape. Dimensions, 110 : 78 μ. The cell membrane is yellow; the pittings of our form are concave. Nordstedt (*ubi. sup.*) marks our species as possibly *pleurotæniopsis*, and De Toni in his Sylloge Algarum I., p 912, has placed it with this species. According to my observations it is a true *Cosmarium* with two pyrenoids and two chlorophyll-plates in each semi-cell. The cell-structure in these thick forms is at first only clearly visible according to colouring and illumination." (Plate IV.)

Hab.: Herston road, Brisbane, *W. J. Byram.*

The following is Dr. Nordstedt's description:—

C. amplum (*pleurotæniopsis*) sinu angusto sublineari extrorsum et introrsum ampliato profunde constrictum; semicellulæ tres partes circuli efficientes (apice interdum paullulo truncatæ) membrana granulis minoribus in series horizontales 17-20 et oblique transversas (c. 23) quincuncialiter ordinatis dense obsessæ, in ipso apice saepe granulis nullis; a latere circulares: a vertice late ellipticæ membrana in centro punctata, ceterum granulata. Nuclei amylacei? (Tantum cellulæ inanes colore luteo-fuscescente a me visæ sunt.)

DOCIDIUM, Bréb.

D. baculum, *Bréb.*

Hab.: Johnstone River and waters of Gulf country, *Dr. Thos. L. Bancroft*; Rockingham Bay, *J. Dallachy.*

D. subundulatum (n. spec.). *Docidium* of medium size, 13-14 times longer than the diameter; semi-cells scarcely attenuated, deeply constricted 8 times; apices tuncated and smooth. Length of cell, 431-432 μ; breadth, 32-33 μ; breadth of isthmus, 17 μ; breadth of apex, 20-22 μ. (Plate XVI.)

Hab.: Rockingham Bay, *J. Dallachy.*

Compare *D. undulatum*, Bail., *D. œdematum*, Turn., Algae of East India, p. 34, Plat. II., fig. 7, and *D. burmense*, Josh., from which, however, this new species clearly differs in the deep, uniform undulation as well as in the straight, smooth ends.

D. Ehrenbergii, *Ralfs.*

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft*; Whitewater, near Mount Albion, *Ch. W. Birch*; Rockingham Bay, *J. Dallachy.*

D. basiundatum, *W. and G. West.* Freshw. Alg. Madagasc., p. 45, Plate V., fig. 35 (sub Pleurotænium). Form 17-19 times longer than its diameter; apices attenuated. Length of semi-cell, 253·5-(cell) 543 μ; breadth of semi-cell, 29-(cell) 30 μ; breadth of apex 19·5-(cell) 19·5 μ. (Plate XVI)

Hab.: Endeavour River, *Persieh.*

W. and G. West assert that the principal form is about 26 times as long as broad; according to the dimensions cited, however, it is only 21-22 times as long as broad.

D. burmense, *Josh.* Form with 14-16 constrictions in the semi-cells. Breadth of base of semi-cell, 43-47 μ; length of semi-cell, 12-15 times greater; breadth of apex, 32-36 μ. (Plate XVI.)

Hab.: Rockingham Bay, *J. Dallachy.*

In the diagnoses furnished by Joshua it is mentioned that the principal form is 15-20 times as long as broad; in the figure supplied, however, the semi-cell alone is at least 12 times as long as broad.

D. nodosum, *Bail.* Form with smooth membrane; inflations of semi-cells, that is with elongated constrictions. Length of semi-cell, 87-97·5-120-130-(cell) 274 μ; greatest breadth, 31-34-39-42-45·5 μ; breadth of isthmus, 12-12-14-22 μ. (Plate XVI.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft*; Rockingham Bay, *J. Dallachy*; between Norman and Gilbert Rivers, *T. Gulliver.*

Form agreeing with next form, but very large. Length of semi-cell, 266-267 μ; greatest breadth, 84-85 μ; breadth of isthmus, 31 μ. (Plate XVI.)

Hab.: Rockingham Bay, *J. Dallachy.*

D. nodosum, var. mammillata (n. var.). Variation with inflations of the semi-cells furnished each with two papillæ. Length of semi-cell, 127-128 μ; greatest breadth, 53-54 μ; breadth of isthmus, 12 μ. (Plate XVI.)

Hab.: Between Norman and Gilbert Rivers, *T. Gulliver.*

D. tesselatum, *Josh.* Length of semi-cell, 208-230 μ; breadth, 36·5-44 μ.

Hab.: Rockingham Bay, *J. Dallachy.*

? D. cylindricum, *Turn.* Algæ of East India, p. 28, Plate II., fig. 11. Form with no inflation above the basal inflation; semi-cells in front view furnished with 10 small tubercles at the apex. Length of semi-cell, 308 μ; greatest breadth, 48 μ. (Plate XVII.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

? Form smaller, apex dilated. Length of semi-cell, 126-162·5 μ; greatest breadth, 26-29 μ; breadth above the inflations, 22-26 μ. (Plate XVI.)

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

D. horridum (n. spec.). Large *Docidium*, 4-6 times longer than its diameter, slightly constricted in the middle; semi-cells furnished with 4 whorls of projecting double spurs; prominences in basal whorl about

15-17; **apex truncate, furnished with from 7-12 spurs.** Length of semi-cells, 153-130-(cell) 198 μ; breadth of semi-cell, 68-49-(cell) 40 μ; breadth of isthmus, 27-26-(cell) 22 μ. (Plate XVII.)

Hab.: Rockingham Bay, *J. Dallachy;* between the Norman and Gilbert Rivers, *T. Gulliver.*

Is nearly akin to *D. Kayei*, Arch.

D. verticillatum, *Ralfs*, **var. ornatum** (n. var.). Variation with elongated prominences, having five-toothed apex; apices of semi-cells furnished with 3 three-toothed processes. Length of semi-cell with processes, 169-236·5 μ; breadth of semi-cell with processes, 40-43 μ; breadth of isthmus, 19·5-22 μ. (Plate XVII.)

Hab.: Between the Norman and Gilbert Rivers, *T. Gulliver.*

Owing to the very lengthened lateral protuberances this form presents a very varied and ornamental appearance.

D. gracile (*Bail.*), *Wittr.* Length of semi-cell with spurs, 153-154 μ; breadth of spurs, 28-29 μ. (Plate XVI.)

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

Possibly the form observed deviates a little from the typical form by the stouter spines.

D. elegans (n. spec.). Large *Docidium* with 5 whorls of spurs; spurs of the lowest whorl 10 in number and smaller; spurs of the other whorls 8 in number and larger; spurs wide apart, straight, or (the upper ones) slightly curved; apex two-lobed, with double-spurred lobes between the lobes, on each side 2 spurs. Length of semi-cell with spurs, 195 μ; greatest breadth with spurs, 65 μ; breadth of isthmus, 19-20 μ. (Plate XVI.)

Hab.: Between the Norman and Gilbert Rivers, *T. Gulliver.*

D. australianum (n. spec.). Large *Docidium*, 5-7 times as long as broad; semi-cells furnished with 4 whorls of spurs, spurs of whorl 12 in number, strong, straight, or slightly curved, standing apart; apex truncate, furnished with 8 spurs. Length of semi-cell with spurs, 208 μ; breadth with spurs, 69 μ; breadth of isthmus, 27 μ. (Plate XVI.)

Hab.: Rockingham Bay, *J. Dallachy.*

Form: Semi-cells with 12 descending spurs in the lowest whorl; spurs of the other whorl, 8 in number, standing apart. Length of semi-cell with spurs, 169-182 μ; breadth of semi-cell with spurs, 61-58·5 μ. (Plate XVI.)

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

TETMEMORUS, Ralfs.

T. Brebissonii (*Menegh.*), *Ralfs*, β **attenuatus,** *Nordst.* Length of cell, 87-139 μ; breadth, 23-26 μ.

Hab.: Johnstone River, *Dr. Thos. L. Bancroft.*

T. granulatus *(Breb.) Ralfs.* Frond fusiform, both in front and lateral views, ending in a colourless lip-like projection; empty frond minutely punctate; zygospore orbicular. Size: Diameter, 38-50 μ (W.); diameter, 39-56 μ (K.); length, 122; diameter, 43 μ (D.).—Cooke's British Desmids, 49. (Plate XII.)

Hab.: Enoggera District.

PLEUROTÆNIUM, Næg.

P. rectum, f. australis, *Racib.* Desm., &c., p. 10, Plate I. fig. 4.

Hab.: Herston road, Brisbane, *W. J. Byram;* rare.

P. tenue (n. sp.), *Schmid.* Professor Schmidle says:—"The entire-edged cells are barely 20 μ broad and about 460 μ long, slightly attenuated towards the ends and then sharply truncated, constricted at the isthmus, furnished with a ring and on either side scarcely perceptibly inflated. The membrane in our specimens is yellowish somewhat granulated; the chlorophyll consists of parietal longitudinal bands." (See Plate II.)

Hab.: Herston road, *W. J. Byram;* rare.

PLEUROTÆNIOPSIS, Lund.

P. turgida, var. ovata, *Nordst.* Freshwater Algæ, New Zealand and Australia, p. 63, Plate VII., fig. 30.

Hab.: With the foregoing; rare.

P. subturgida, var. minor, *W. Schmidle.* Algæ of Sumatra, p. 300, Plate VII., fig. 4. Professor Schmidle says:- "Our specimens agree perfectly in shape and cell-dimensions with the forms from Sumatra and Samoa. As appears from the remarks of Mœbius in Flora, 1892, p. 442, he had likewise observed this form in his material from Australia, and had described it as *Pl. turgida* (Breb.), Lund. Upon the relationship of our alga to *Penium australe,* Racib., see my remarks in Engler's Bot. Annual, 1896, on the Algæ of Samoa collected by Reinecke. Very abundant at Blackstone, Ipswich, Herston road, and Jenkins' Quarry, near Bundamba. In the material from Herston road zygotes of our variety were abundantly present. These were in diameter about 27 μ broad, and about 10 μ long, often somewhat curved and furnished with stout spines." (Plate II.)

P. bigibbum, *W. Schmidle* (n. sp.). Professor Schmidle gives the following description:—"The cells are about 100 μ long, 60 μ broad, and 48 μ thick, furnished in the middle with a moderately deep, narrow, straight constriction. The cell membrane is finely punctate; the semi-cells possess a straight base, slightly rounded under corners, and diminish upwards in the shape of globes to the widely-rounded vertex. (Rarely the under corners stand out sideways like papillæ.) The vertical view above the isthmus is characteristic. It is circular to oval, and carries on both sides a small clearly-projecting knob, which is formed by a considerable thickening of the cell-membrane. The chlorophyll consists of parietal longitudinal bands." (Plate II.)

Hab.: Blackstone, Ipswich, *W. J. Byram.*

CLOSTERIUM, Nitzsch.

C. striolatum, *Ehrenberg.* Frond from 6 to 10 times as long as broad, lunate, attenuated; upper margin convex, slightly depressed in the centre; lower concave; ends very obtuse, rounded; large granules in a single series; empty frond reddish, especially near the ends;

striæ very numerous, crowded, transverse sutures usually three; zygospore orbicular, smooth. Size: 0·3-0·37 mm. × 40-45 μ (R.); diameter, 38-40 μ (W.).—Cooke's British Desmids, 29. (Plate VIII.)

C. striolatum, var. *a.* **typicum,** *Klebs.* Desm. of East Prussia, p. 14.

Hab.: Blackstone, Ipswich, *W. J. Byram;* scattered.

C. intermedium, *Ralfs.* Frond slender, 12 to 15 times as long as broad, slightly curved, very gently tapering, upper margin convex, gradually arched, lower slightly concave; ends obtuse, rounded; large granules in single series; empty frond pale straw coloured; striæ distinct, numerous, but not crowded; transverse sutures usually more than three; zygospore globose, smooth. Size: 0·32-0·45 mm. × 22 μ (R.); zygospore, 54 μ (L.).—Cooke's British Desmids, 29. (Plate X.)

Hab.: Blackstone, Ipswich, *W. J. Byram;* rare.

C. Ralfsii, *Breb.* Frond stout, 6 to 9 times as long as broad, the upper margin slightly convex, lower concave, ventricose at the middle, each extremity tapering into a narrow slender reddish beak, shorter than the body, slightly curved downward; ends obtuse; large granules conspicuous in a single series; empty frond reddish, especially near the ends; striæ numerous, close and distinct; central suture accompanied by several transverse lines. Size: 0·3 mm. × 50 μ (R.); diameter, 42-47 μ (W.).—Cooke's British Desmids, 32. (Plate X.)

C. Ralfsii, var. *β.* **typicum,** *Klebs.* Desm. East. Prussia, Plate II., fig. 6*c*. Dimensions, 500-550 : 52 μ.—*Schmidle.*

Hab.: Herston road, Brisbane, *W. J. Byram.*

Professor Schmidle adds:—"Our forms might just as well have been classed with *Cl. lineatum*, *b. sandevicense*, Nordst., Algæ Aquæ Dulcis Sandiv., p. 9, fig. 10. Börgesen also in Desm. Brazil, Plate II. fig. 4, and Raciborski in Desm., &c., Plate VI., fig. 42, class in the same way analogous forms."

C. cornu, *Ehrenb.* Frond minute, 5 to 8 times as long as broad, slender, slightly curved, attenuated, ends blunt; endochrome not reaching to the extremities; large granules indistinct, in a single series; empty frond colourless, without striæ; zygospore quadrate in front view, elliptic in end view. Size: 0·17 mm. × 6½ μ (R.).—Cooke's British Desmids, 35. (Plate VIII.)

C. cornu, var. Brasiliense, *Börgesen.* Desm Brazil, Plate 2, fig. 8, p. 935. Professor Schmidle says:—"The cells are somewhat straighter than in Börgesen *loc. cit.* Dimensions, 100 : 5 μ."

Hab.: Bowen Park, Brisbane, *W. J. Byram;* rare.

C. Kutzingii, *Breb.* List., Plate II., fig. 40. The specimens have a smooth, yellowish cell-membrane, and terminate in long fine horns. Breadth of cell, 20 μ.—*Schmidle.*

Hab.: Herston road, Brisbane, *W. J. Byram;* near Mount Albion, North Queensland, *C. W. Birch.*

C. incurvum, var. *β* **majus,** *Wittr.* Dimensions, 152 : 12 μ.—*Schmidle.*

Hab.: Enoggera District, *W. J. Byram;* rare.

PENIUM, Breb.

P. lamellosum, *Breb.*

Hab.: Waters of the Gulf country, *Dr. Thos. L. Bancroft.*

CYLINDROCYSTIS, Menegh.

C. Brebisonii, *Menegh.*, var. turgida. Alp. Algæ, p. 9, Plate XIV., fig. 15. Dimensions, 52 : 32 μ.—*Schmidle.*

Hab.: Blackstone, Ipswich, *W. J. Byram*; rare.

CALOTHRIX, Ag.

C. parietina, *Thuret.* Professor Schmidle says:—"The plants form short perpendicular tufts growing upon the soil or wood, &c., of scarcely a millimeter in length and dark colour. It is only rarely branched, becomes attenuated in the upper part (prolonged into a hair?), is often curved at the under portion and has generally, especially here, thick, somewhat projecting, colourless sheaths, rarely reddish and fissured in the upper part. The heterocysts are basal. The thickness of the filaments with the sheaths amounts to 4-12 μ."

Hab.: Queensland, locality?

PLECTONEMA, Thuret.

Filaments branched, ramifications produced by the branching of the trichome outside the sheath, very irregular, and often germinate as in *Scytonema.*—Cooke's Freshwater Algæ, 263.

P. Wollei, *Farlow.*

Hab.: Queensland, locality?

OSCILLATORIA, Vauch.

O. sancta, var. caldariorum, *Gomont.*

Hab.: Queensland, locality?

GLAUCOCYSTIS, Itzigs.

G. nostochinearum, *Itzgs.*

Hab.: Queensland, locality?

GLŒOTHECE, Næg.

G. Baileyana, *W. Schmidle.* Professor Schmidle says:—"The bluish-green cells are elliptical, 12-20 μ long, 8-12 μ thick, and surrounded by a beautiful thick and solid gelatinous envelope of a bluish tint; so that the whole cell attains a length of 20-34 μ, and a thickness of 16-24 μ. The cells are usually found isolated, more rarely from 4-8 surrounded by one wide envelope, which perhaps is somewhat thinner, but in other respects exhibits the same blue colour and characteristics as the isolated cells." (Plate II.)

Hab.: Jenkins' Quarry, Bundamba, *W. J. Byram*; scattered amongst Desmidiaceæ.

ADDENDA AND CORRIGENDA.

Page 9.—For "Cœlastmum" read "Cœlastrum."
Page 10.—For "Glæotænum" read "Glœotænium."
Page 12, line 9.—For "*gemima*" read "*genuina.*"
Page 12, line 10.—After "figs. 4-5" add "(Plate XVII.)"
Page 16, line 10 from foot.—After "fig. 13" add "(Plate XVII.)"

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WITH

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Fig. *f.*—Stigeoclonium Askenasyi, *Schmid.*, n. sp.

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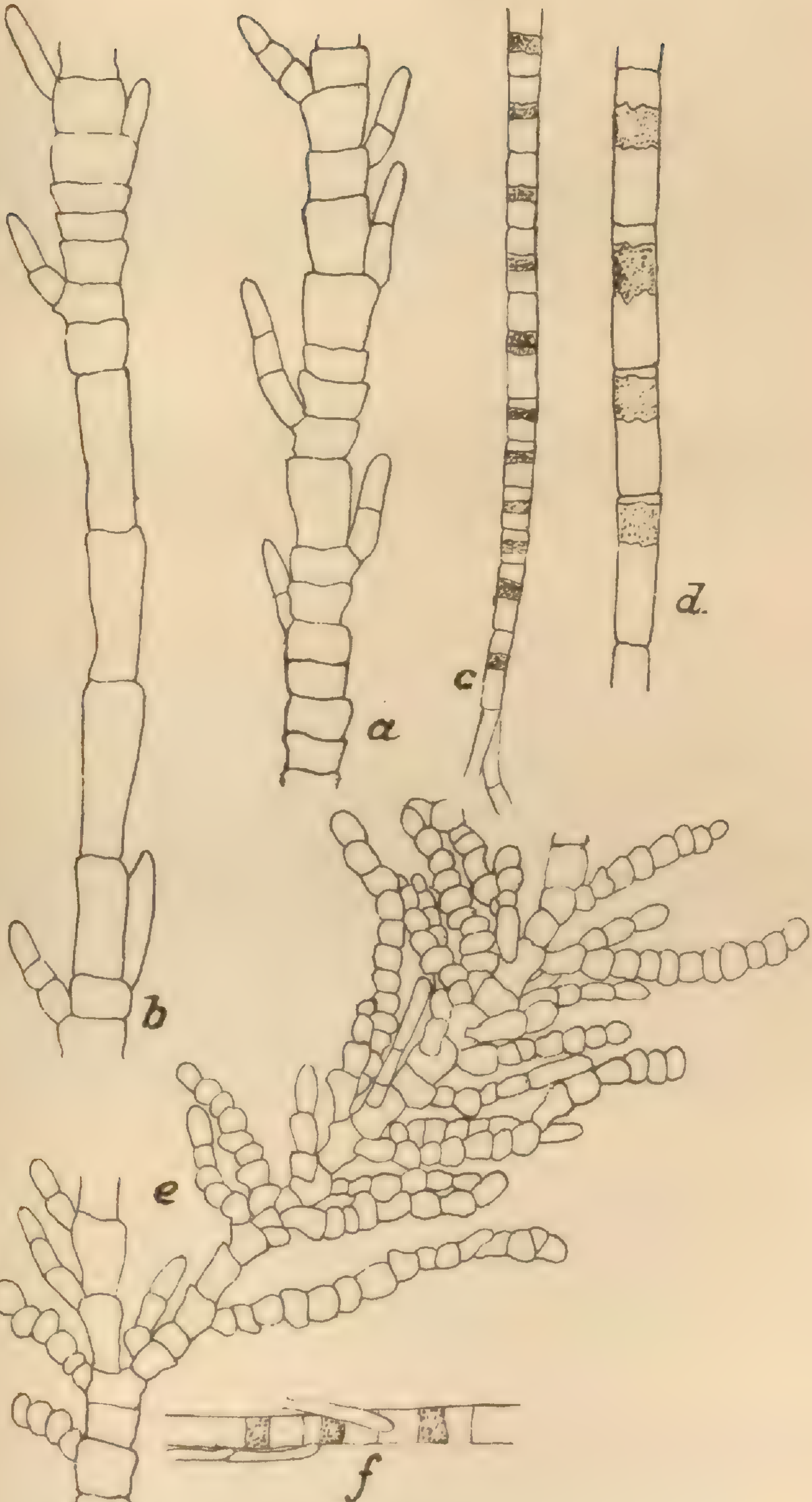

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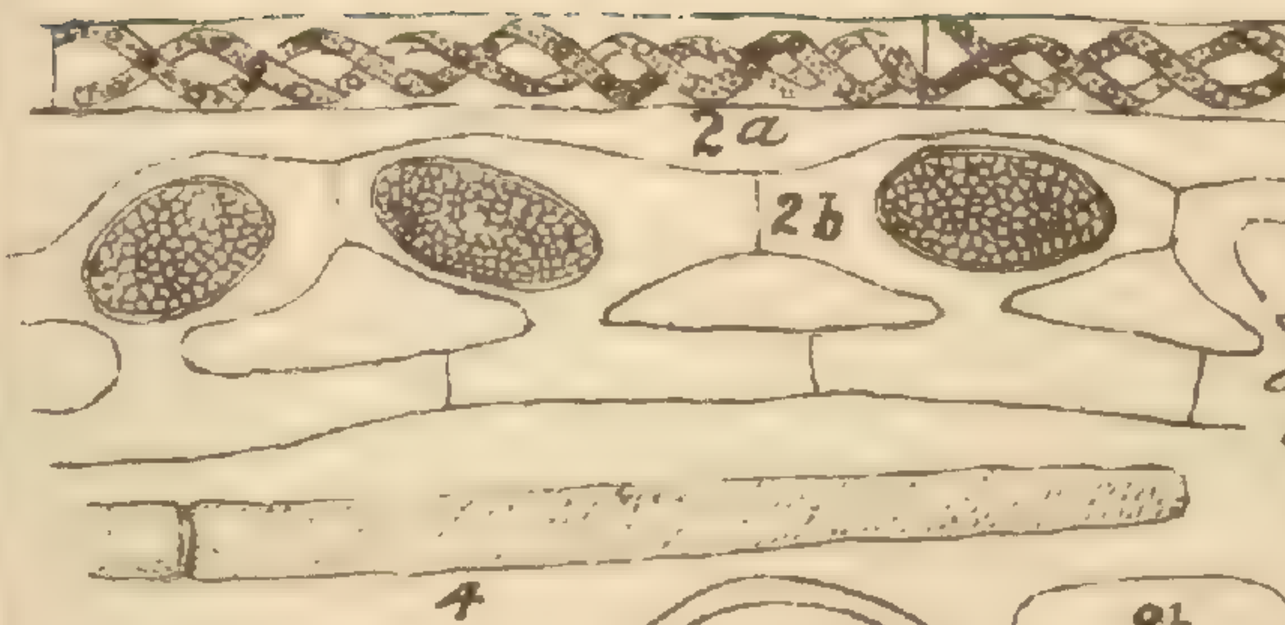
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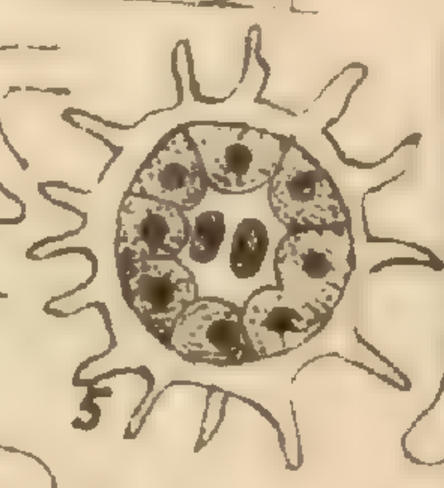
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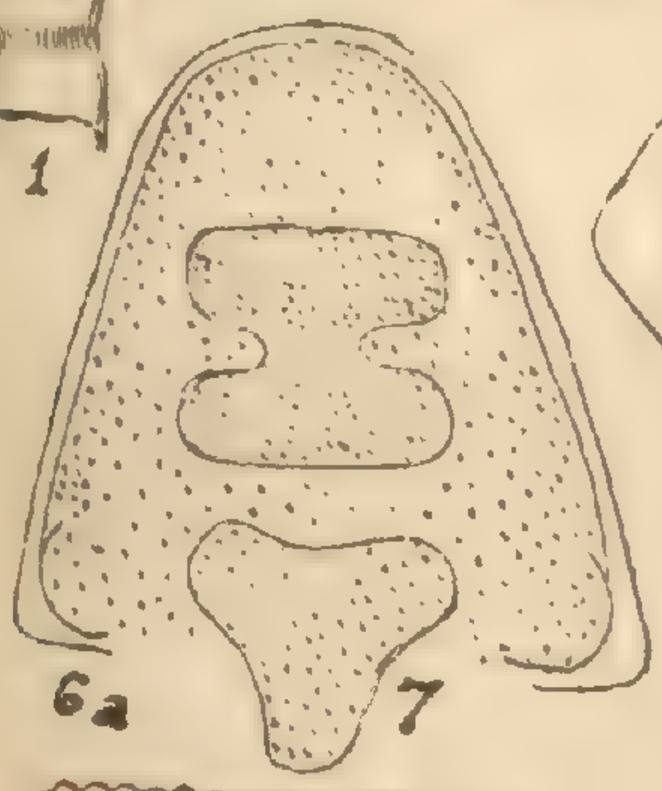
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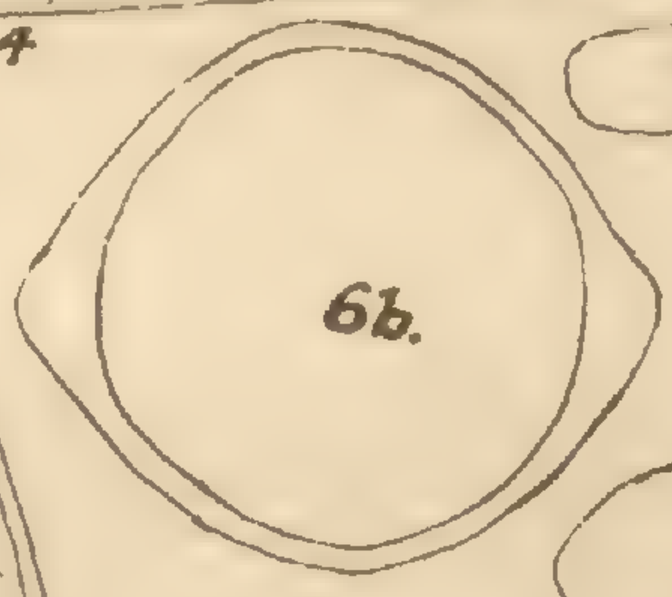
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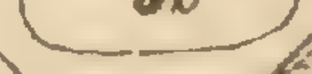
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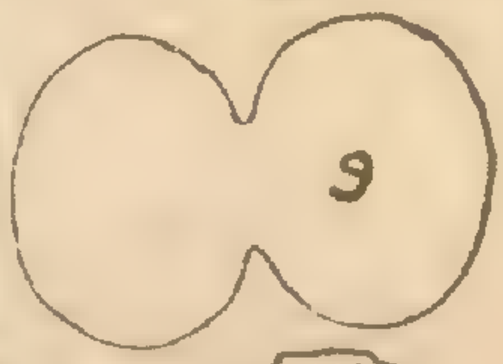
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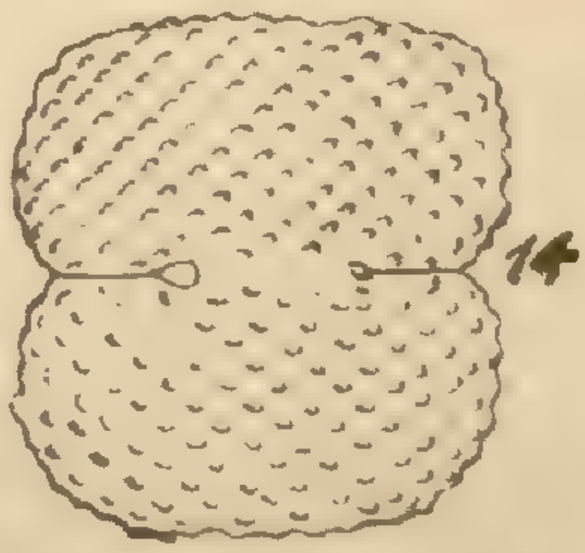
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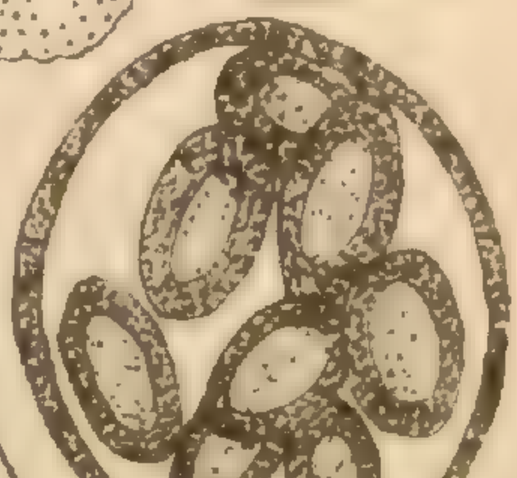
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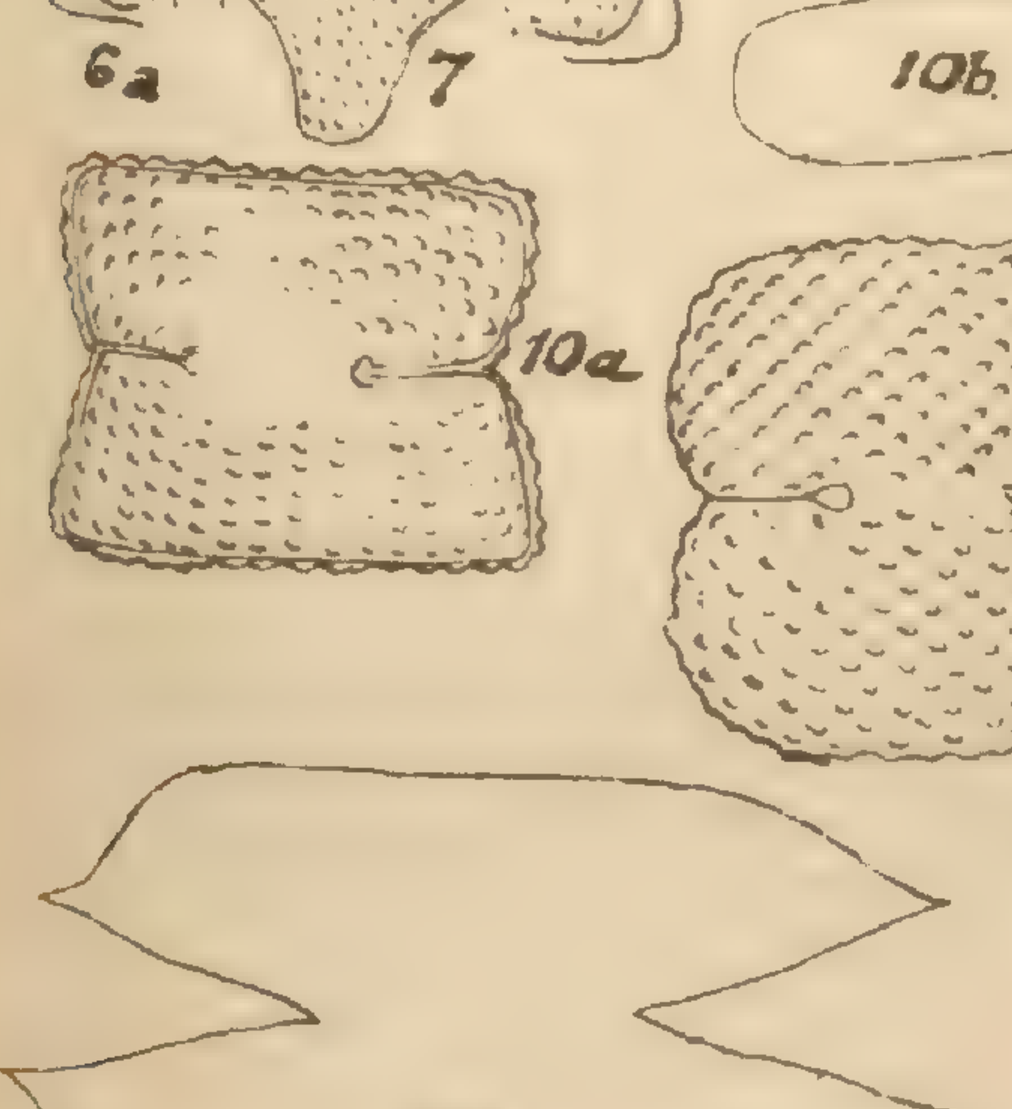
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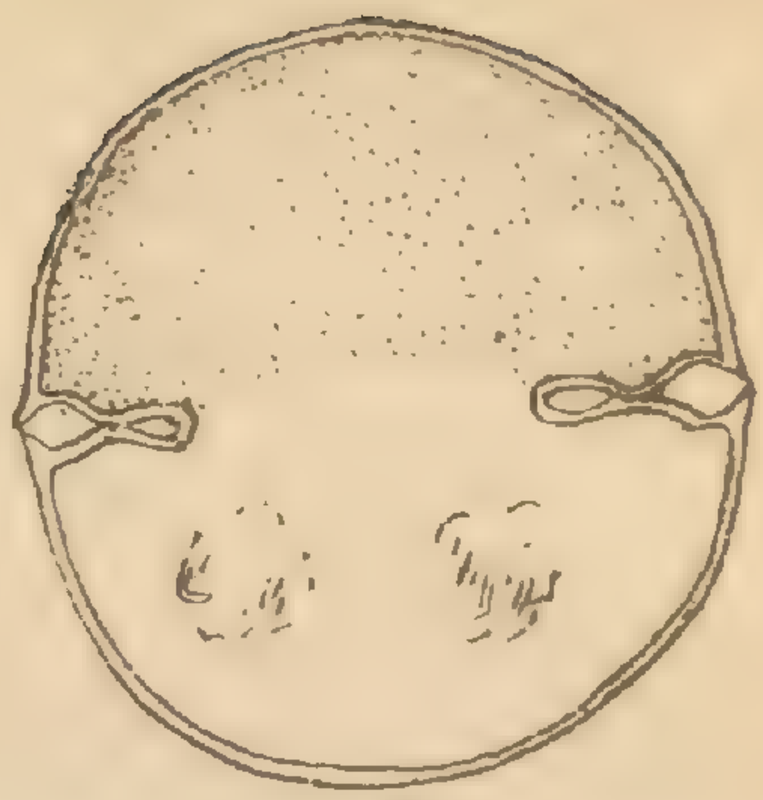
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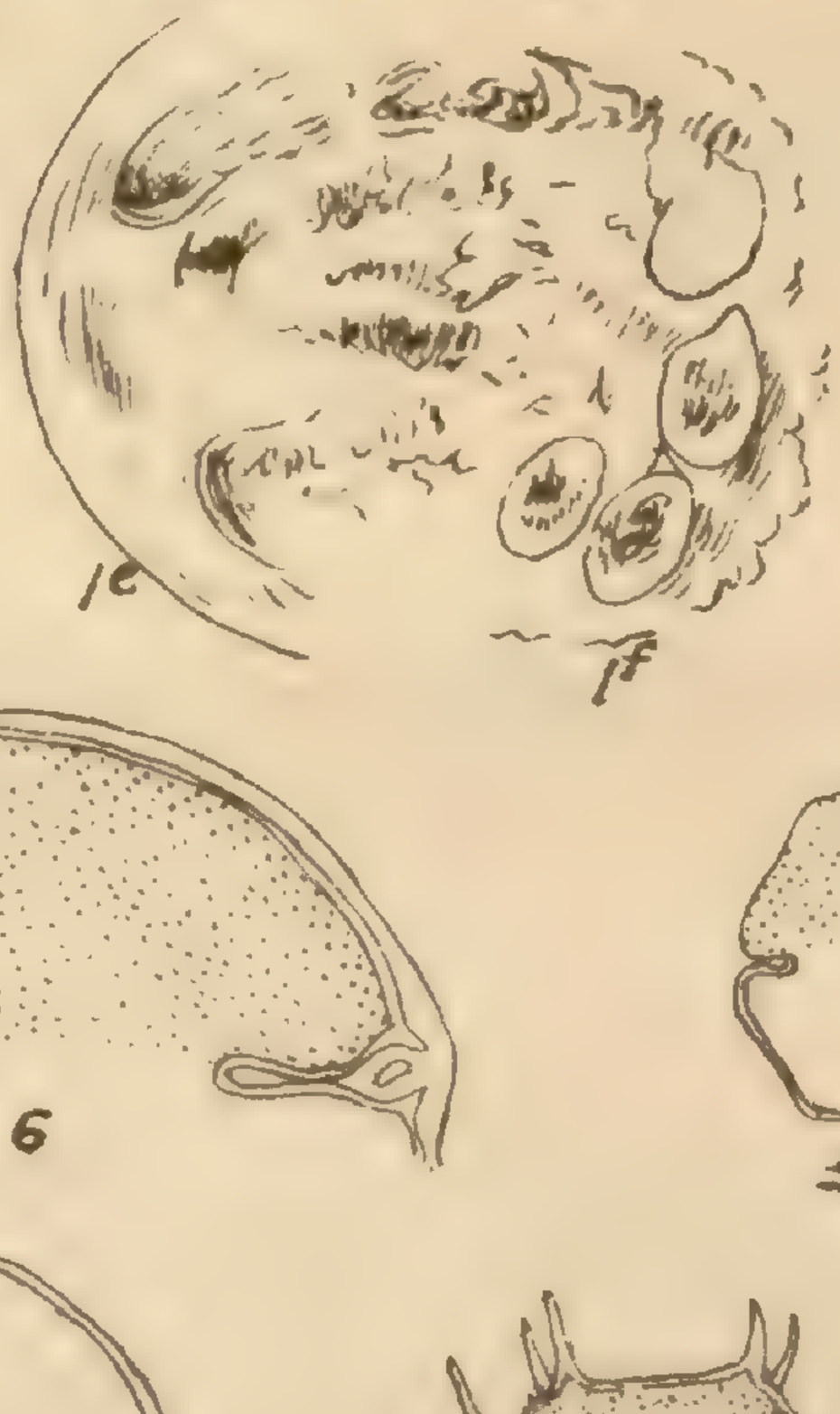
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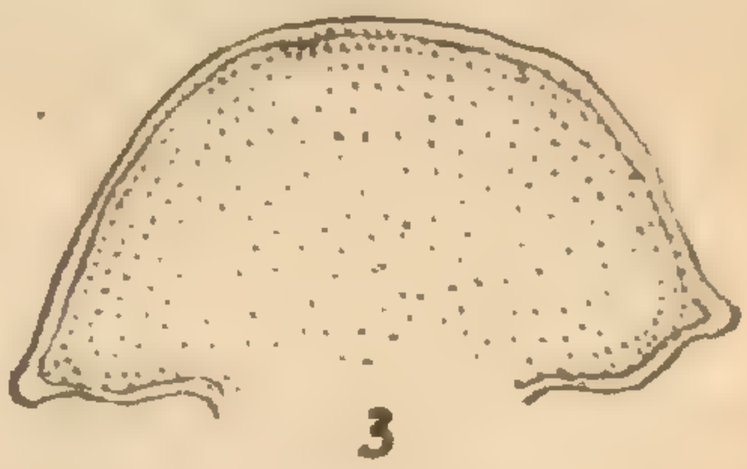
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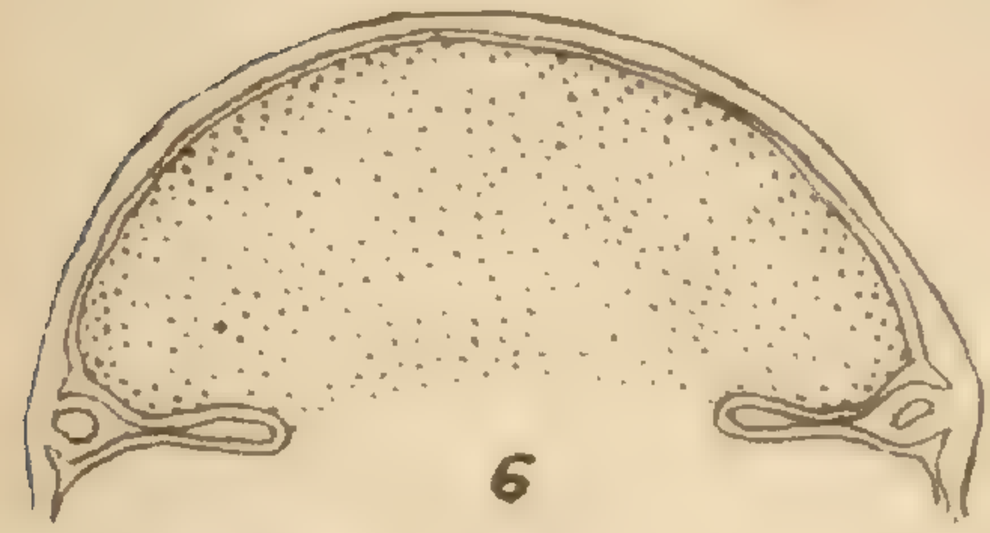
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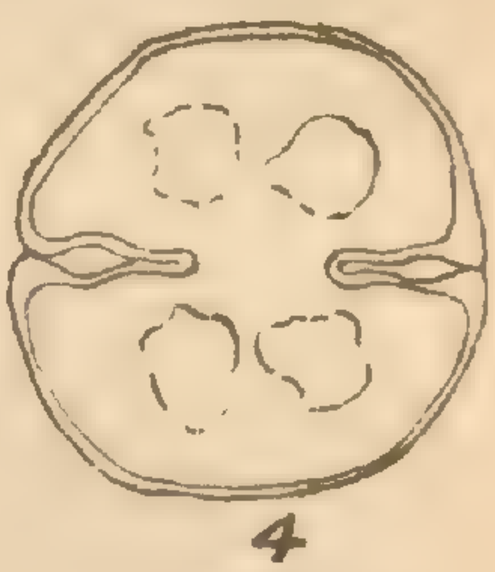
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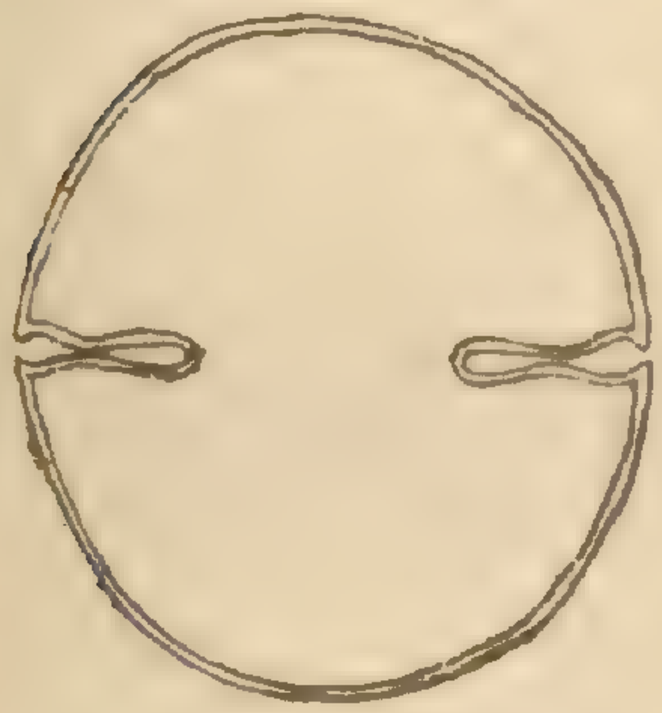
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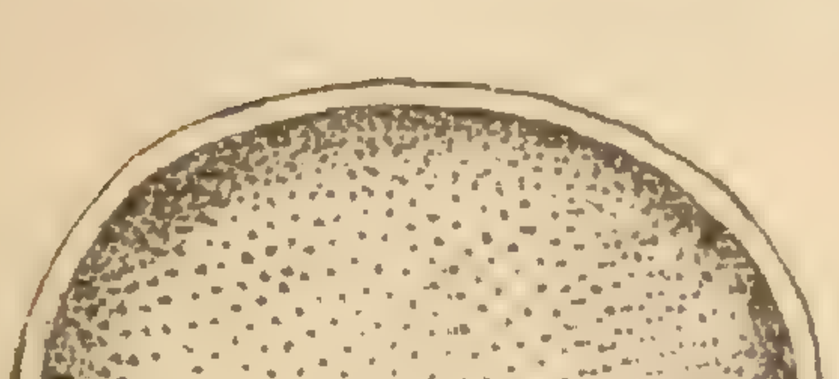
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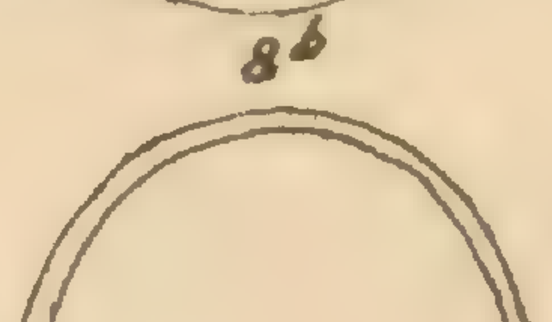
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1a

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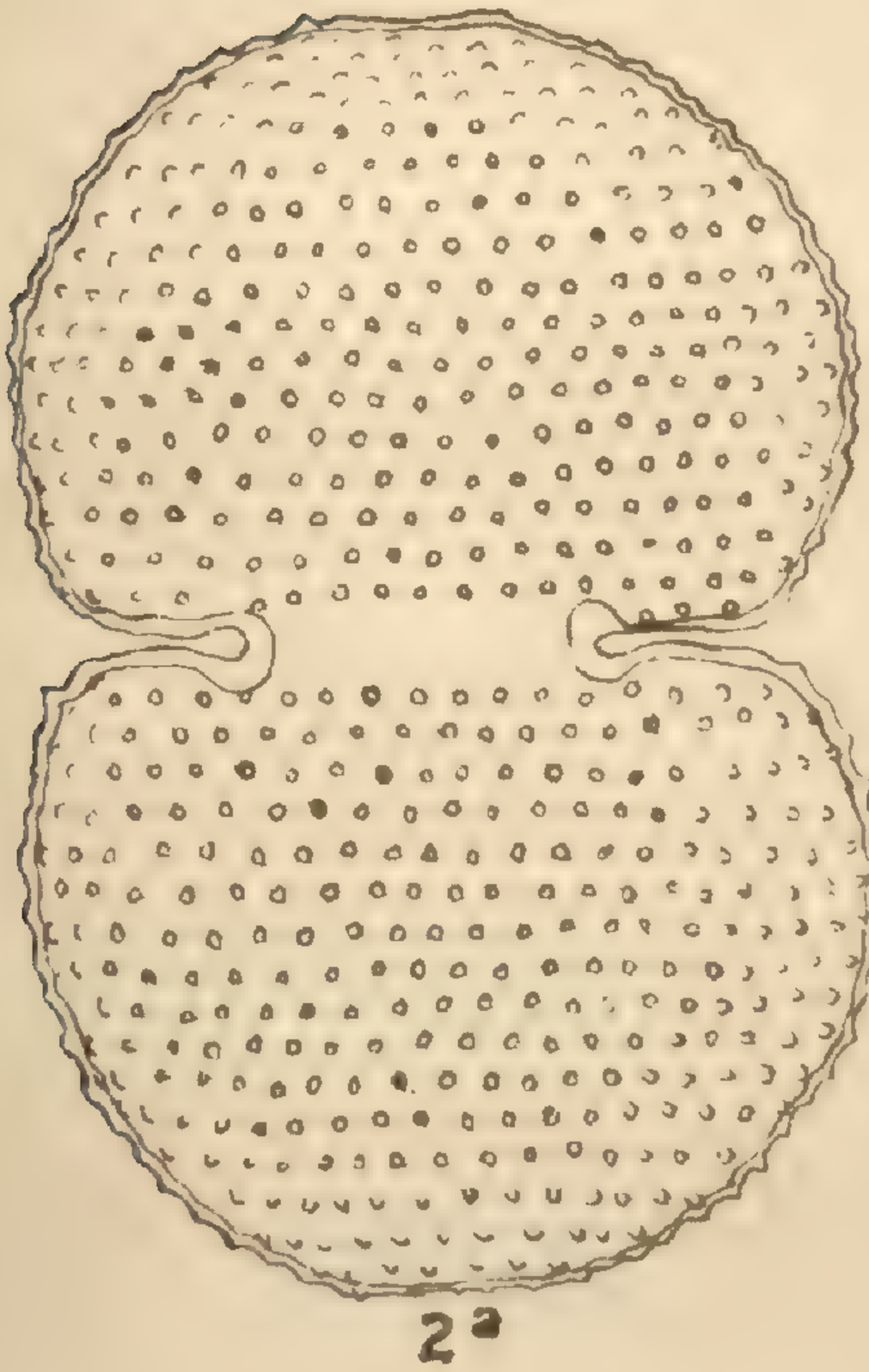

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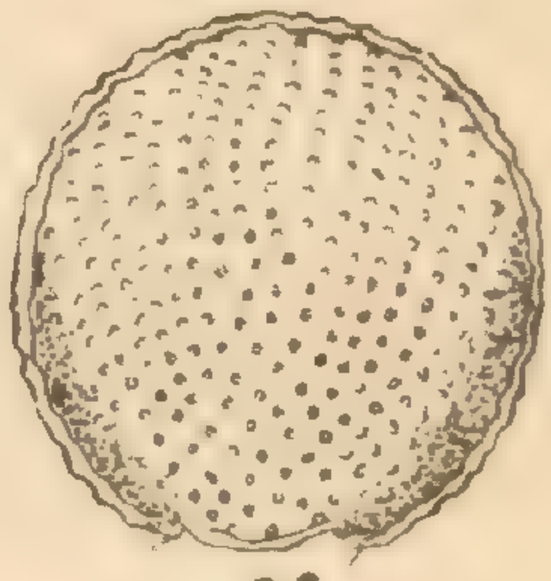

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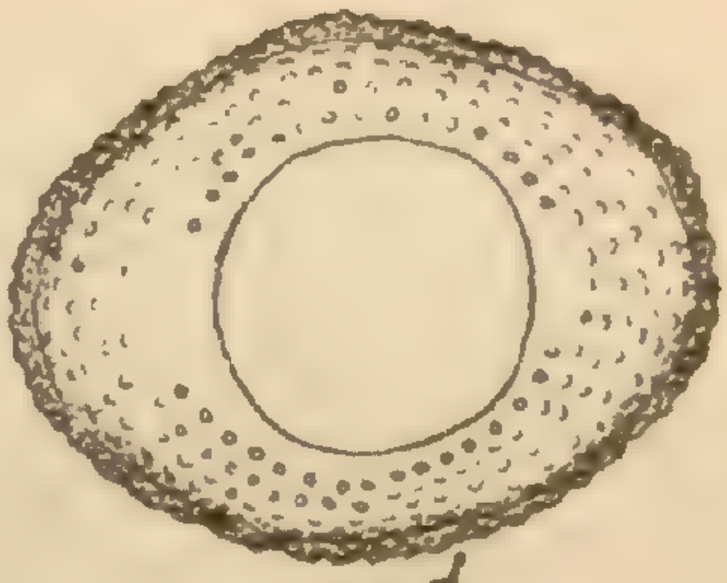

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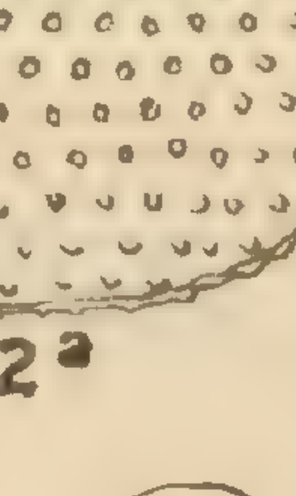

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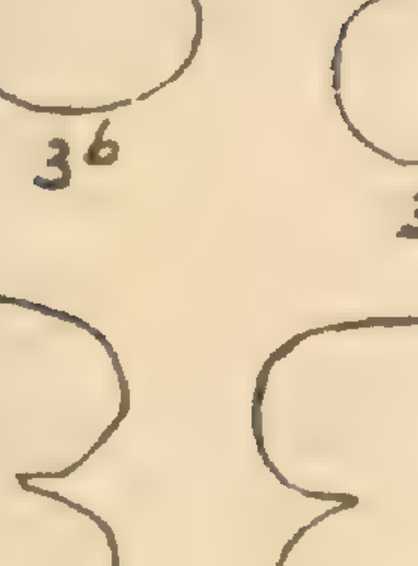

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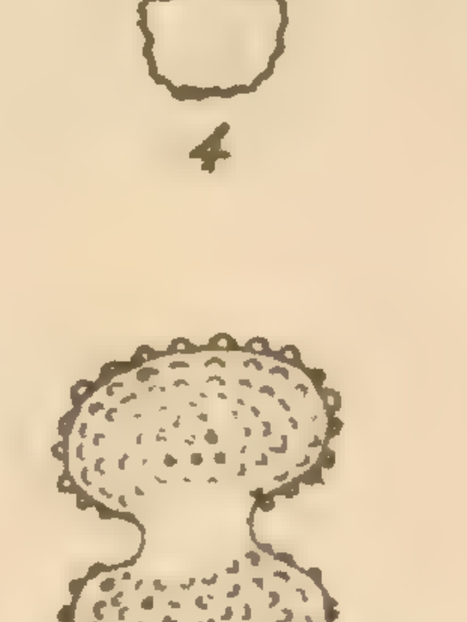

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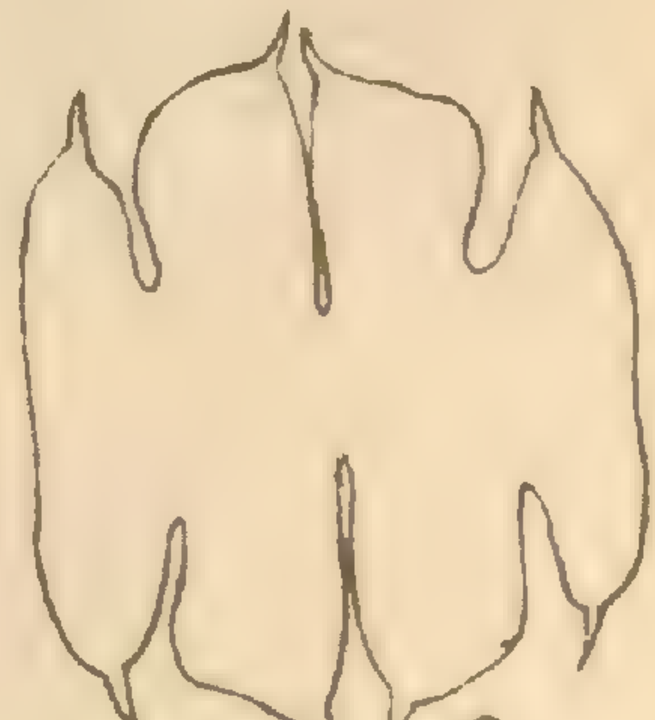

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Fig. 7.—Œdogonium punctato-striatum, *De Bary.*

Figs. 8, 9, 10.—Dictyosphærium pulchellum, *Wood.*

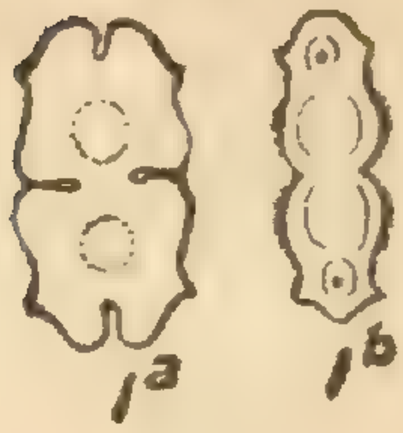
Figs. 11, 12.—Microspora abbreviata, *Rabb.*

Figs. 13, 14, 15, 16, 17.—Cosmarium nitidulum, *De Not.*

Fig. 18.—Cosmarium venustum, *Breb.*

PL V

1e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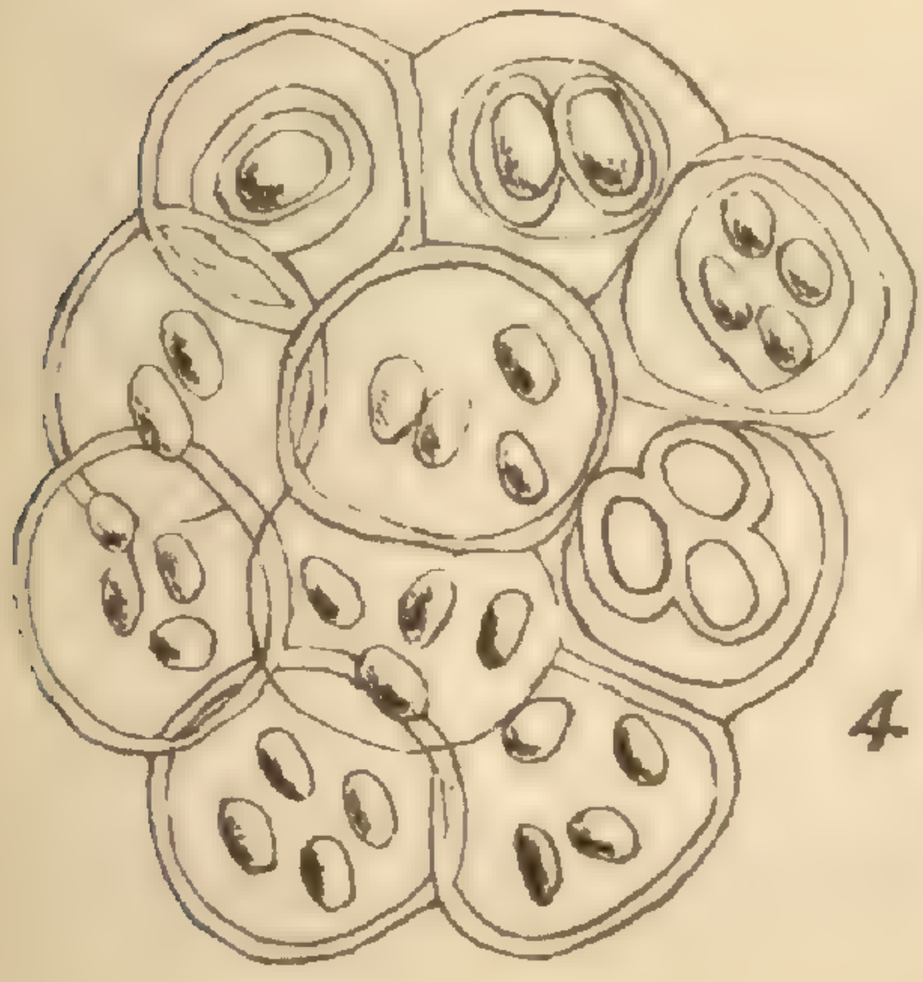
2 3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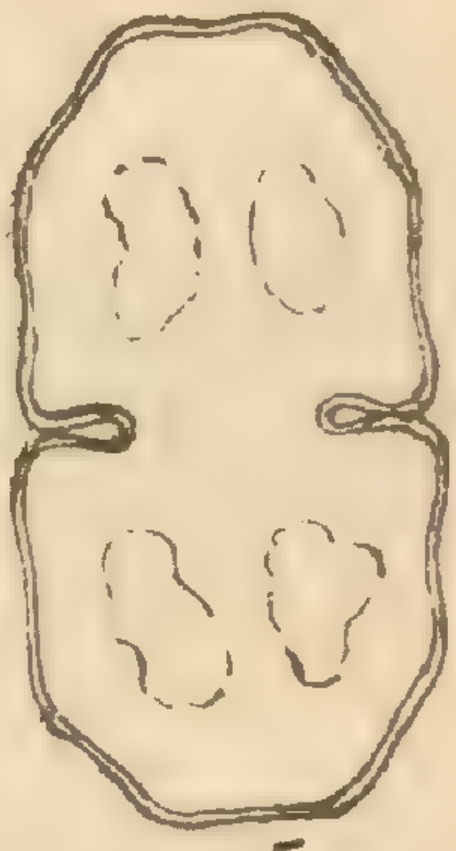
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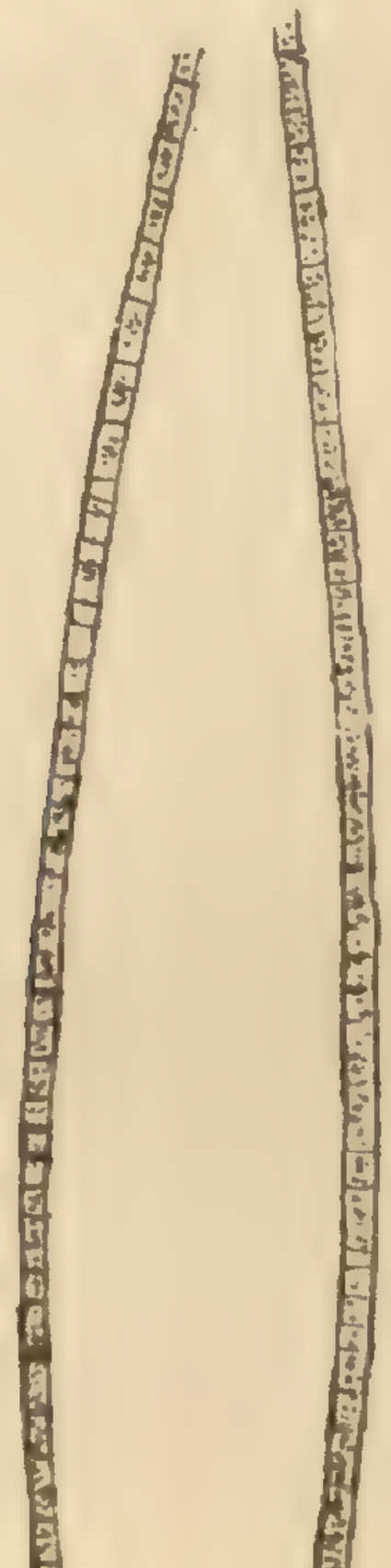
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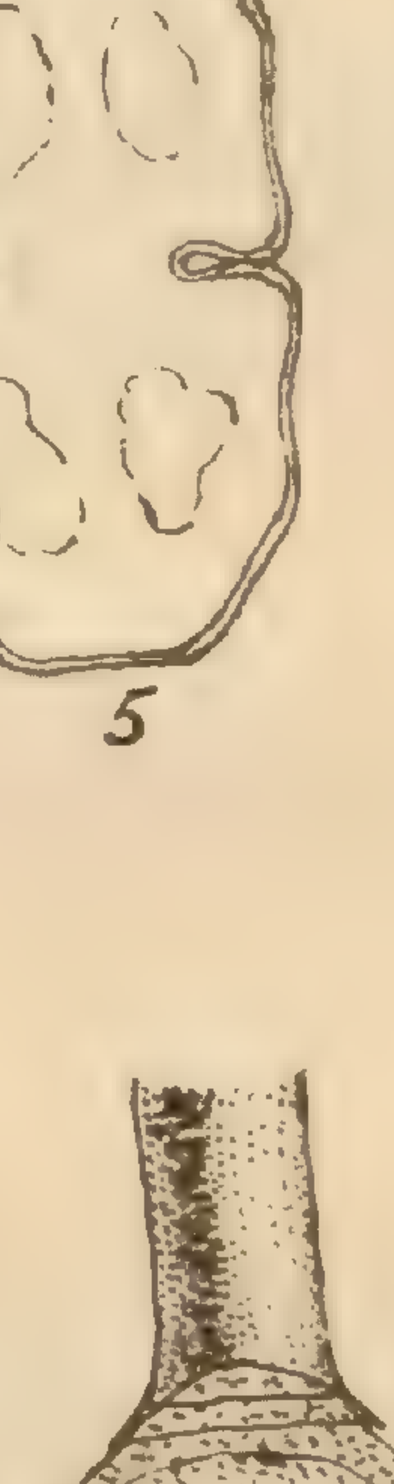
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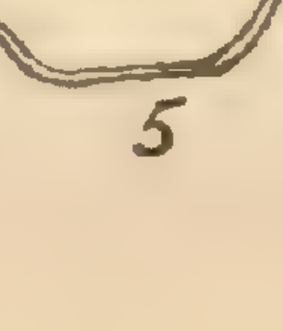

8 9

10

7

Plate VI.

Fig. 1*a*.—Sirogonium sticticum, *Kutz*. Sterile cells, x 200.

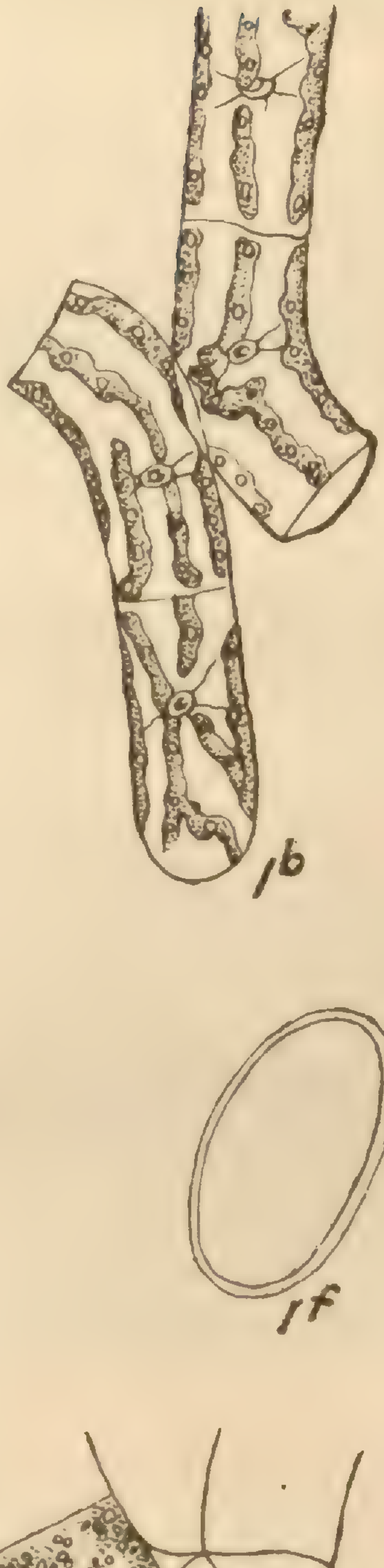
Figs. 1*b*, 1*c*, 1*d*, 1*e*.—Sirogonium sticticum, *Kutz*. Conjugating cells, x 200.

Fig. 1*f*.—Sirogonium sticticum, *Kutz*. Zygospore, x 400.

(In text, page 10, *S. strictum* should be as above.

PL VI

1a



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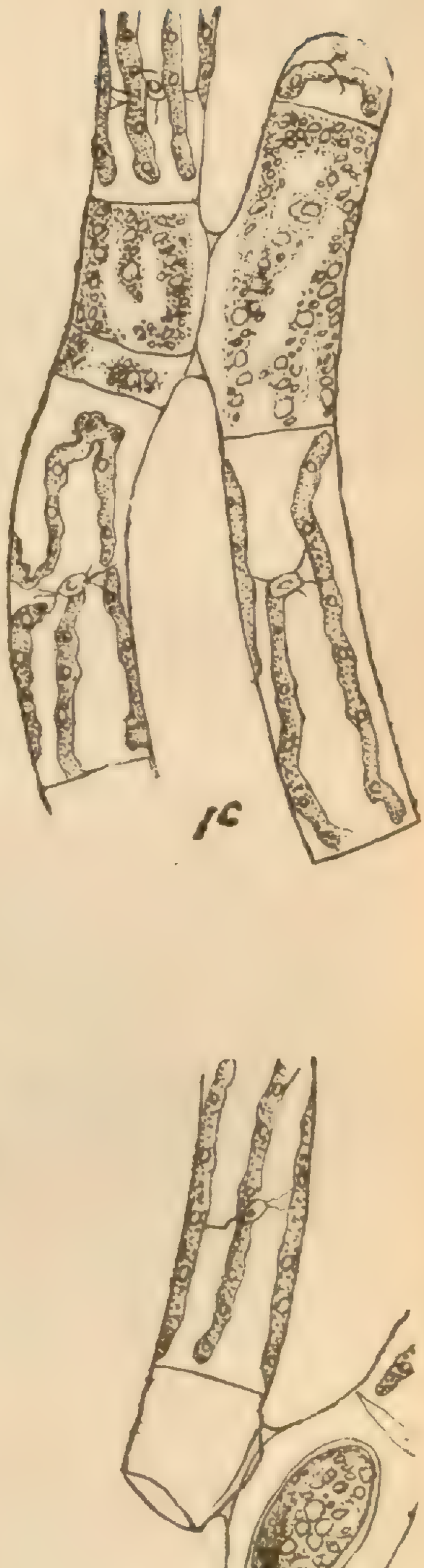


1c

1f

1d

1e

Plate VII.

Figs. 1, 2.—Cosmarium moniliforme, *Turp.*

Fig. 3.—Cosmarium moniliforme. After division, new semi-cells enlarged.

Fig. 4.—Cosmarium moniliforme. Zygospore.

Figs. 5, 6, 7.—Cosmarium Blyttii. Front, side, and end views.

Figs. 8, 9.—Euastrum compactum, *Wolle.*

Figs. 10, 11.—Staurastrum Bienneanum, var. ellipticum, *Wille.*

Figs. 12*a*, 12*d*.—Cosmarium Portianum. Living fronds.

Figs. 12*b*, 12*c*.—Cosmarium Portianum. Empty fronds.

Fig. 12*e*.—Cosmarium Portianum. End view.

Fig- 12*f*.—Cosmarium Portianum. Zygospore.

Figs. 13*a*, 13*b*.—Cosmarium botrytis. Living fronds.

Figs. 13*c*, 13*d*.—Cosmarium botrytis. Empty fronds.

Fig. 13*e*.—Cosmarium botrytis. End view.

Fig. 13*f*.—Cosmarium botrytis. Side view.

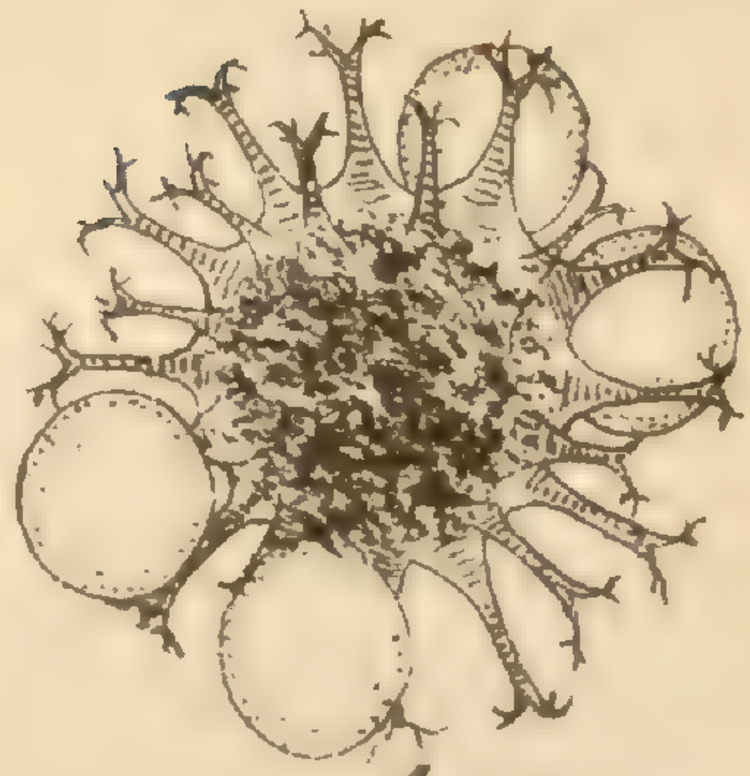
Fig. 13*g*.—Cosmarium botrytis. Zygospore.

Pl VII

1

2

3



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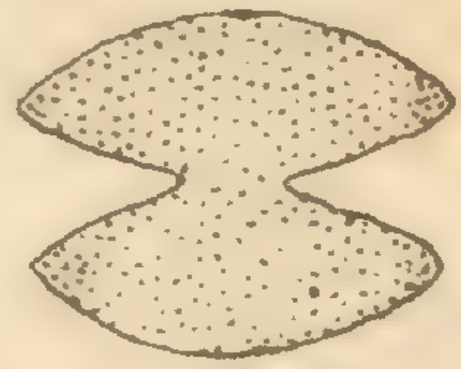

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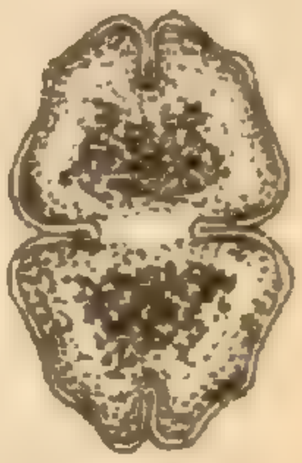

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12a

12b

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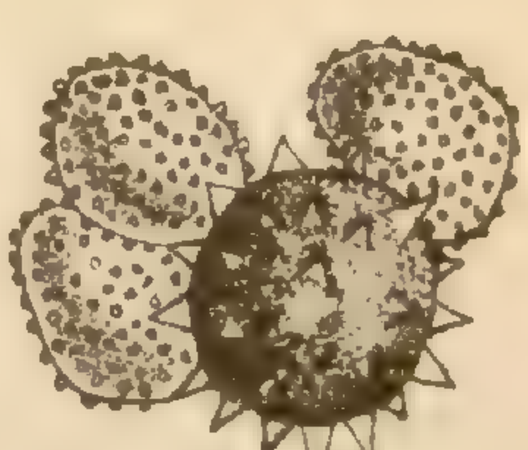

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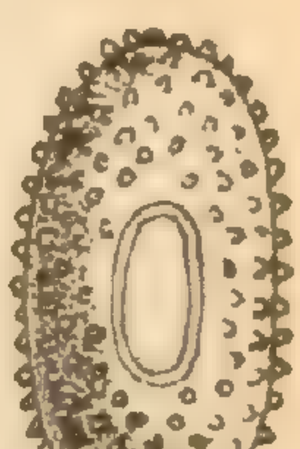

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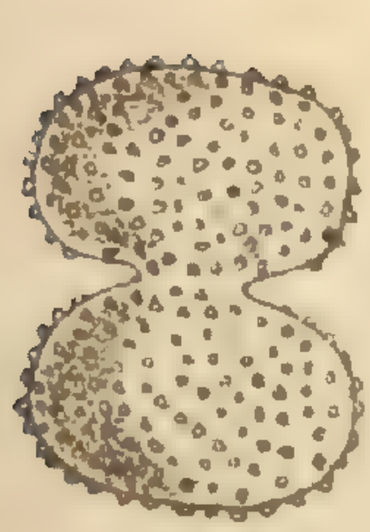


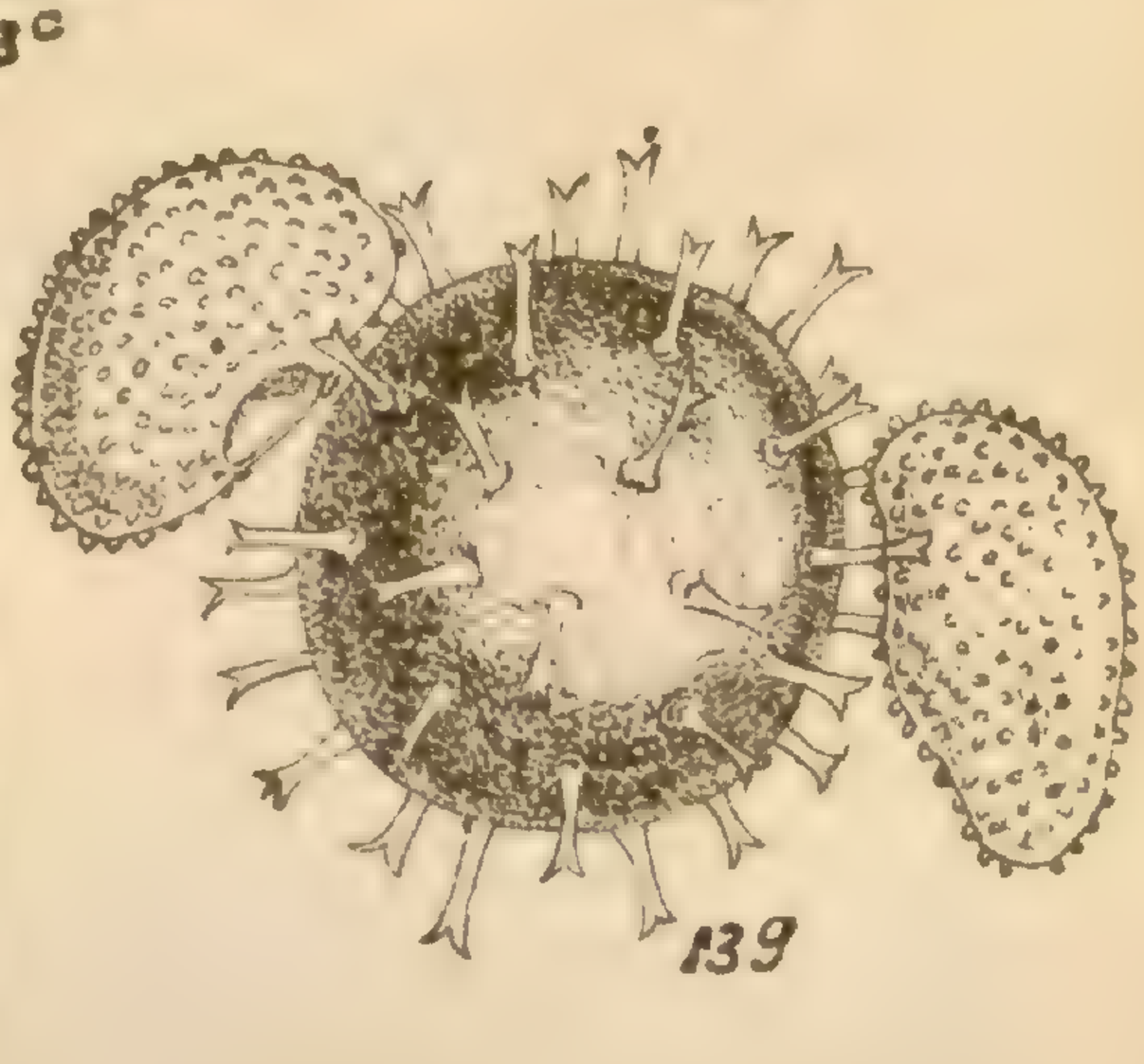
12c

12d

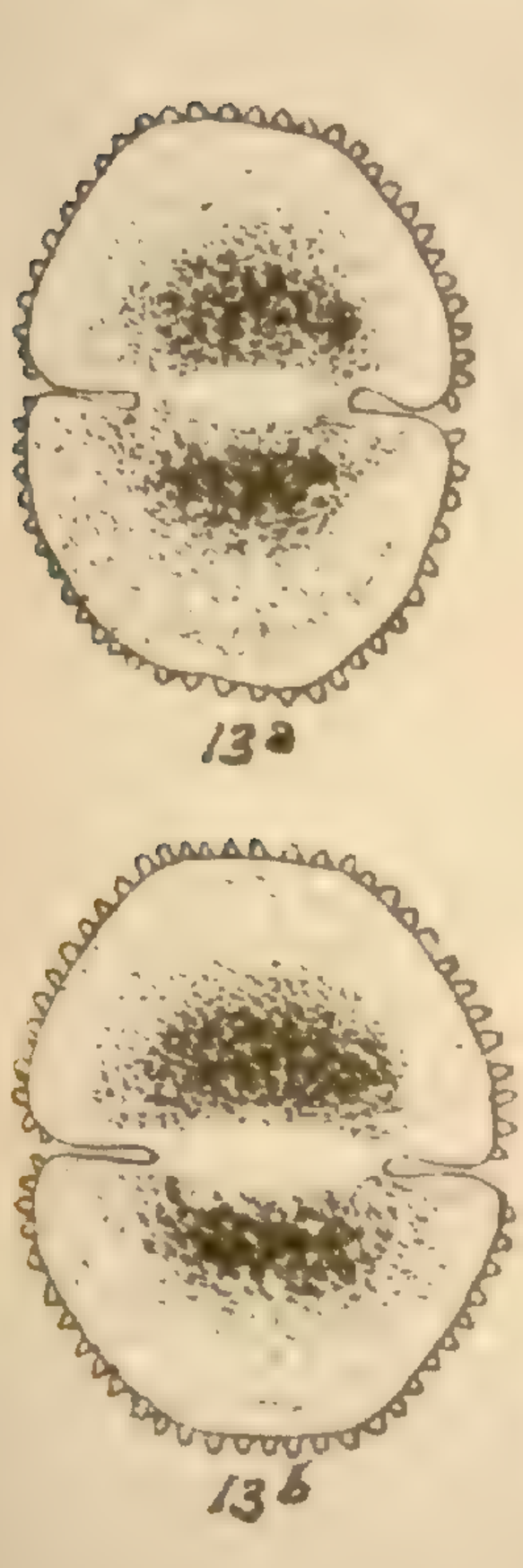
13c

13d

13a



13g



13b

13f

Plate VIII.

Fig. 1*a*.—Closterium striolatum, *Ehr*. Living cell.

Fig. 1*b*.—Closterium striolatum, *Ehr*. Empty cell.

Fig. 1*d*.—Closterium striolatum, *Ehr*. Zygospore.

Fig. 2*a*.—Closterium cornu, *Ehr*. Living cell.

Fig. 2*b*.—Closterium cornu, *Ehr*. Empty cell.

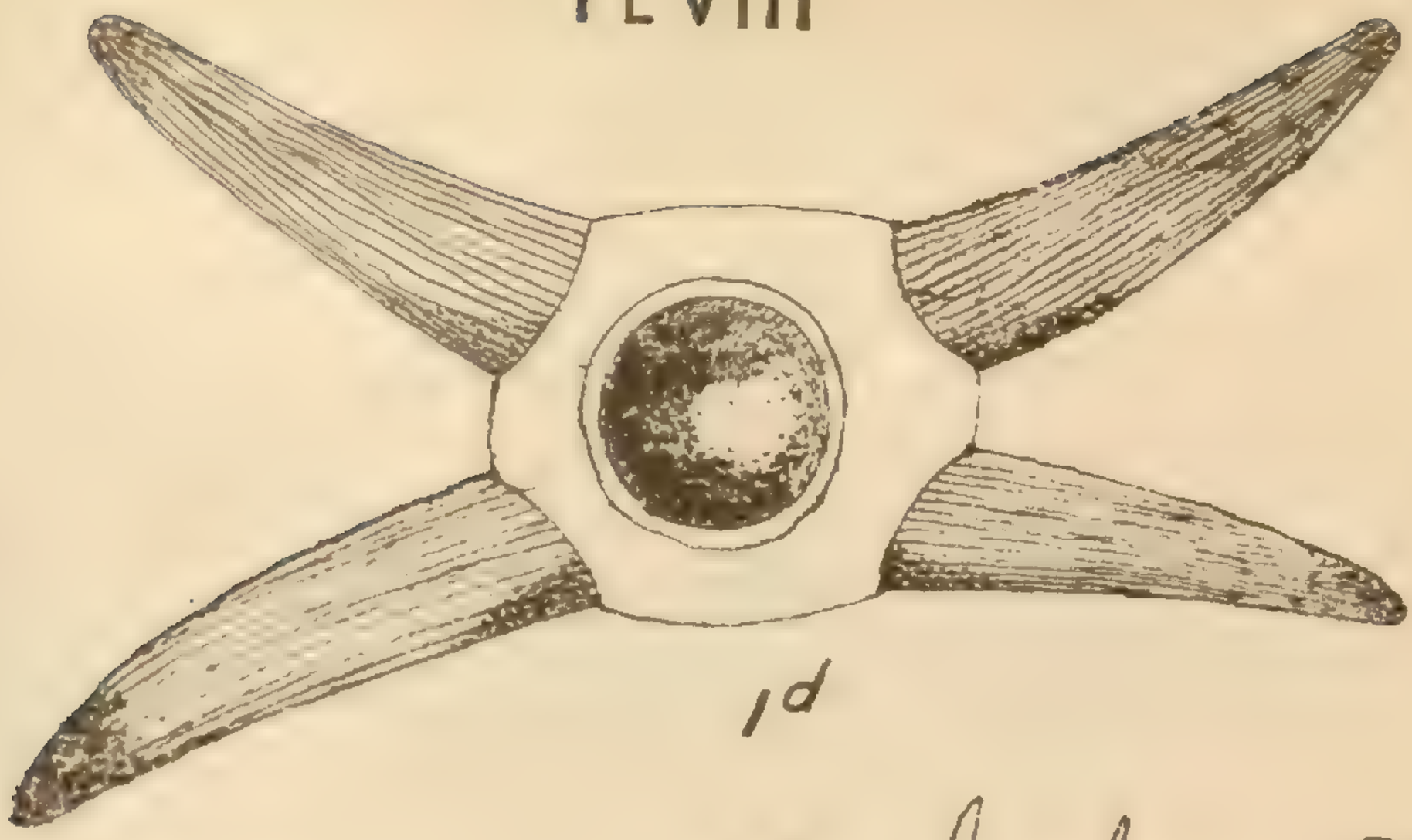
Fig. 3*a*.—Staurastrum orbiculare, *Ralfs*. Living frond.

Figs. 3*b*, 3*c*.—Staurastrum orbiculare, *Ralfs*. Empty fronds.

Figs. 3*d*, 3*e*, 3*f*.—Staurastrum orbiculare, *Ralfs*. End views.

Fig. 3*g*.—Staurastrum orbiculare, *Ralfs*. Zygospore.

Pl VIII



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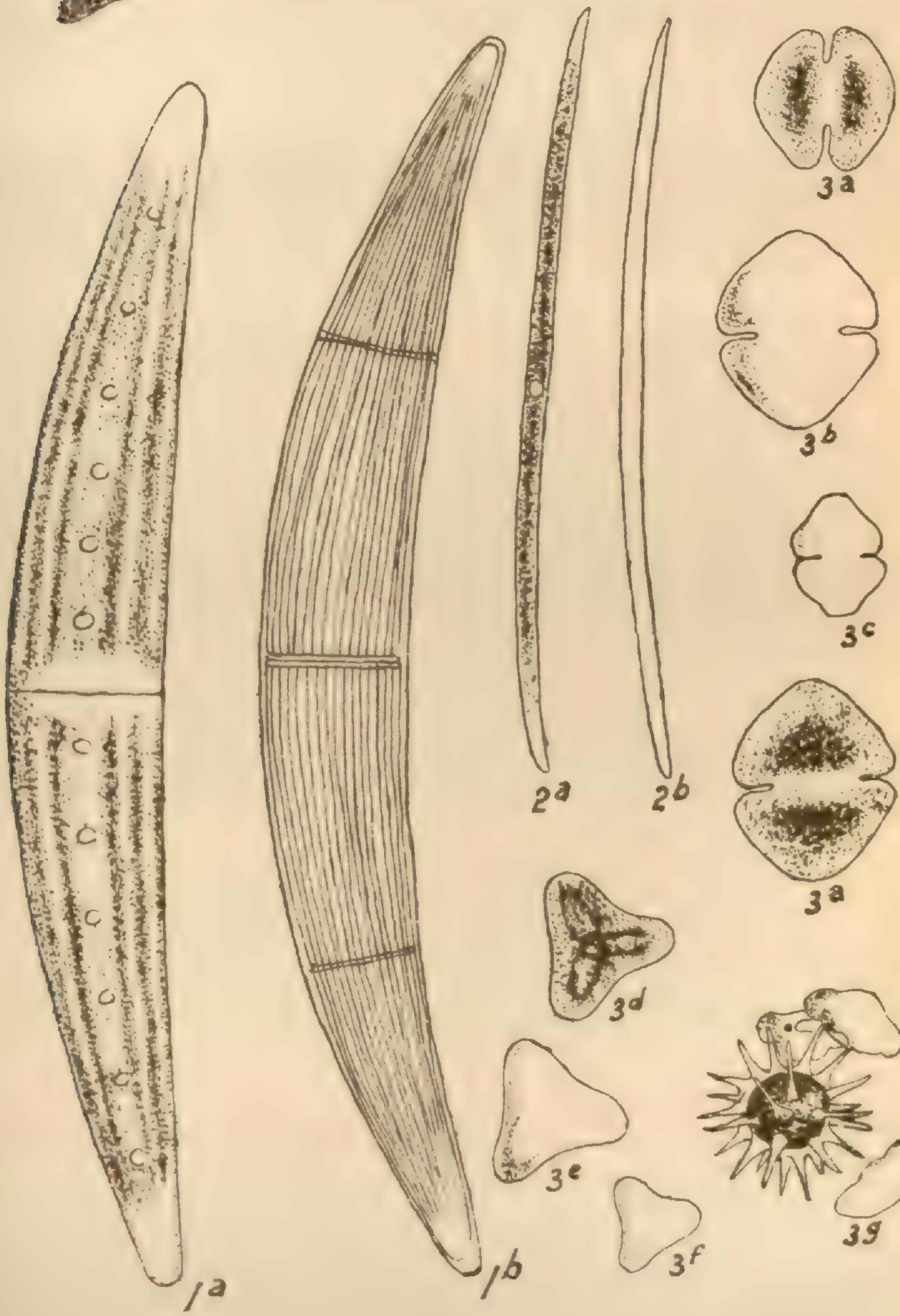


1a

1b

2a

2b

3a

3b

3c

3d

3e

3f

3g

Plate IX.

Fig. 1*a*.—Cosmarium pachydermum. Living frond.

Fig. 1*b*.—Cosmarium pachydermum. Side view.

Fig. 1*c*.—Cosmarium pachydermum. End view.

Fig. 2*a*.—Cosmarium punctulatum. Living frond.

Fig. 2*b*.—Cosmarium punctulatum. Empty frond.

Fig. 2*c*.—Cosmarium punctulatum. Side view.

Fig. 2*d*.—Cosmarium punctulatum. End view.

Fig. 3*a*.—Cosmarium Reinschii. Living frond.

Fig. 3*b*.—Cosmarium Reinschii. Empty frond.

Fig. 3*c*.—Cosmarium Reinschii. End view.

Fig. 4*a*.—Cosmarium Regnesii. Living frond, x ——.

Fig. 4*b*.—Cosmarium Regnesii. Empty frond, x ——.

Fig. 4*c*.—Cosmarium Regnesii. Empty frond, x 1,000.

Fig. 5*a*.—Cosmarium quadrum. Living frond.

Fig. 5*b*.—Cosmarium quadrum. Empty frond.

Fig. 6.—Euastrum inermius, *Nordst.*

Fig. 7*a*.—Euastrum cuneatum, var. solum, x 400.

Fig. 7*c*.—Euastrum cuneatum, var. solum, x 400.

Fig. 7*d*.—Euastrum cuneatum, var. solum, x 400.

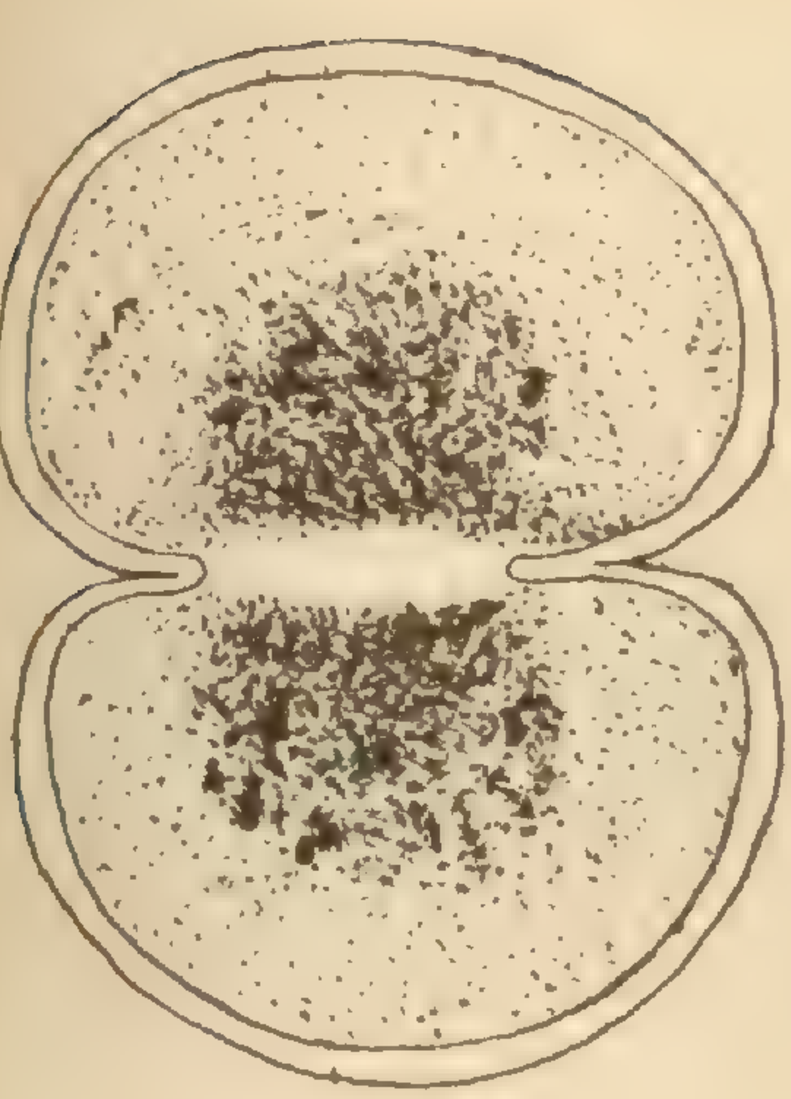
Fig. 8*a*.—Staurastrum gracile, var. uniseriatum, *West.*

Fig. 8*b*.—Staurastrum gracile, var. uniseriatum, *West.*

Fig. 9*a*.—Cosmarium Meneghinii, var. concinnum.

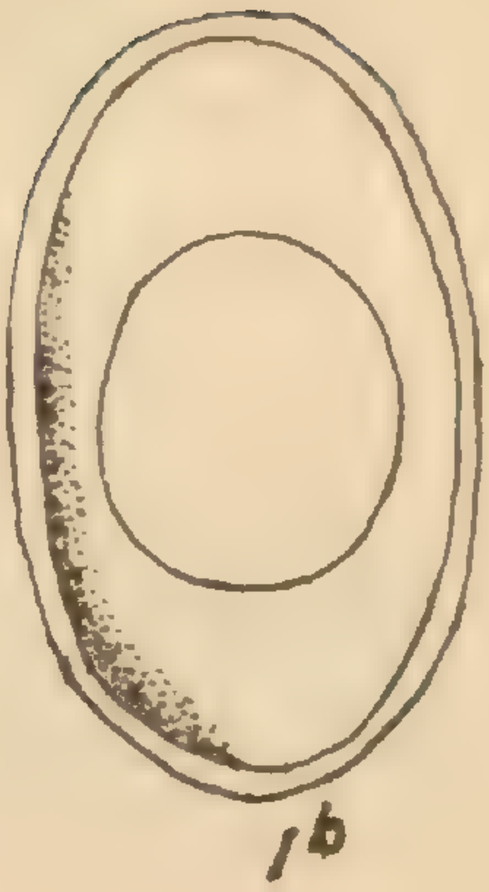
Fig. 9*b*.—Cosmarium Meneghinii, var. concinnum.

Pl. IX



1a

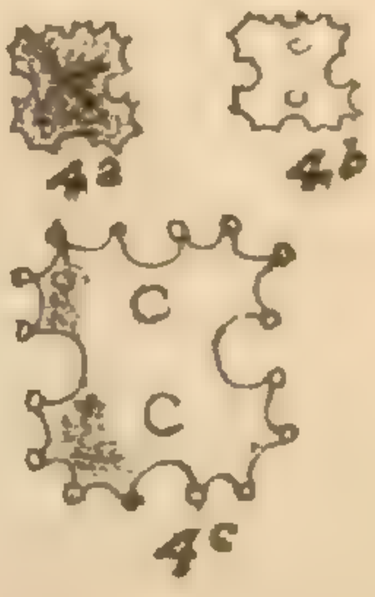
1a



1b

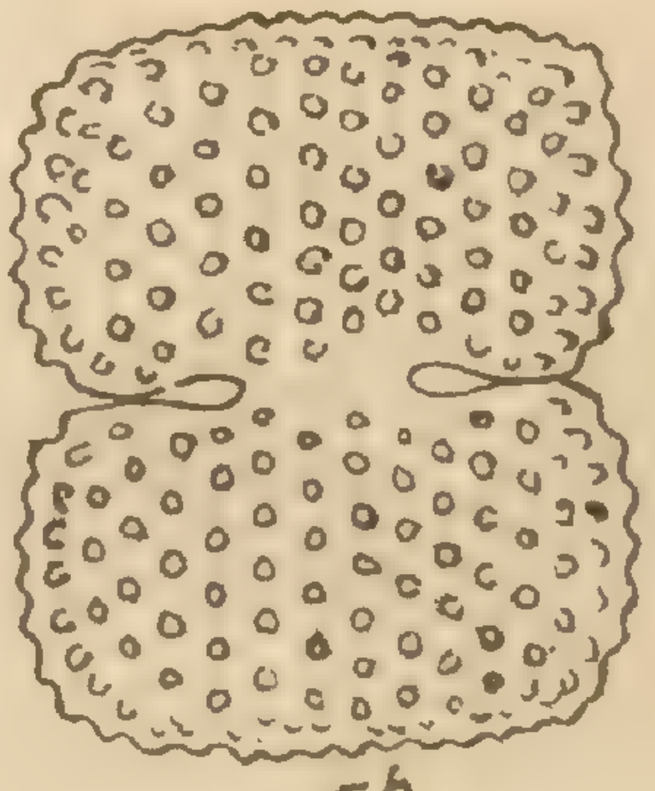
2a 2b 2c 2d

3a 3b 3c



4a 4b 4c

5a



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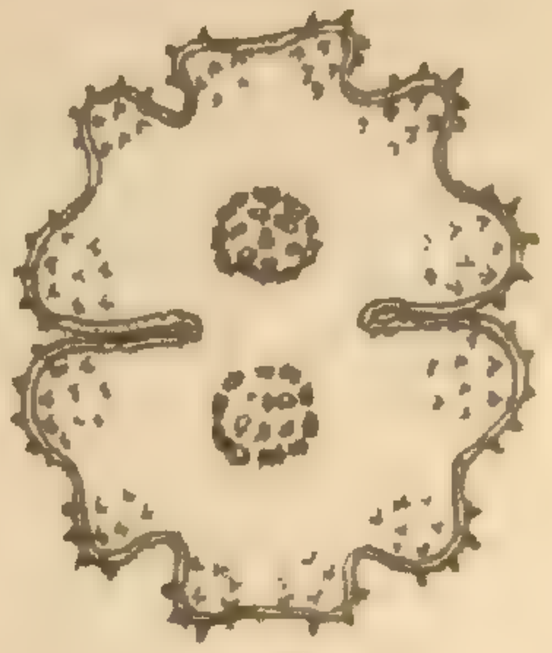


6

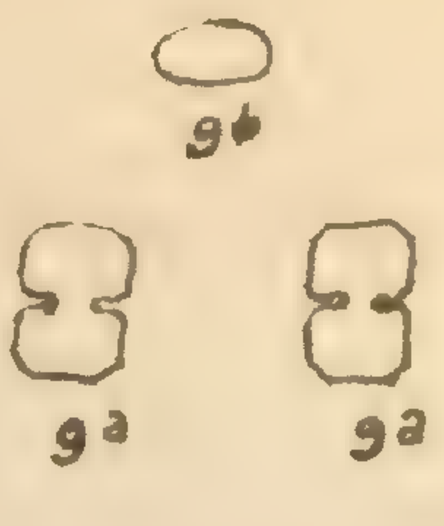
7d

7a

7c

8a

8b



9a 9b

Plate X.

Fig. 1*a*.—Closterium intermedium, *Ralfs*. Living cell.

Fig. 1*b*.—Closterium intermedium, *Ralfs*. Empty cell.

Fig. 2*a*.—Closterium, Ralfsii, *Breb*. Living cell.

Fig. 2*b*.—Closterium, Ralfsii, *Breb*. Empty cell.

Fig. 3.—Closterium, Ralfsii, *Breb*. Empty cell.

PL. X

Plate XI.

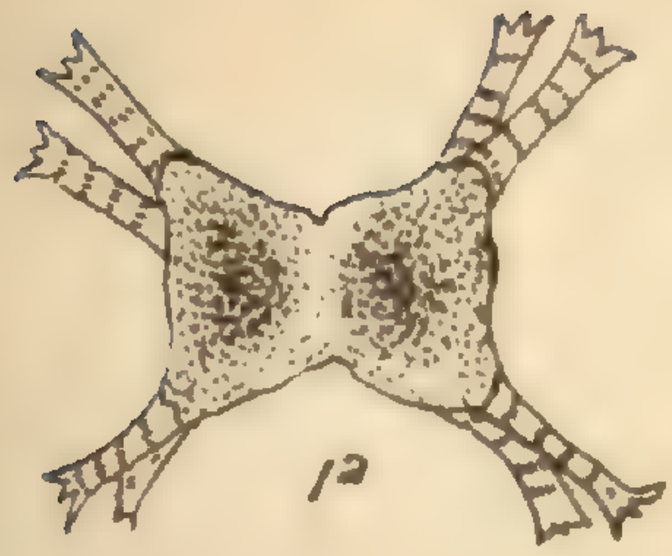
Figs. 1*a*, 1*b*, 1*c*, 1*d*.—Staurastrum gracile, *Ralfs*.

Figs. 2*a*, 2*b*, 2*c*.—Staurastrum paradoxum, *Mey*.

Figs. 3*a*, 3*b*.—Staurastrum sexangulare, *Lund*.

Figs. 4*a*, 4*b*, 4*c*, 4*d*, 4*e*.—Staurastrum pygmæum.

Pl. XI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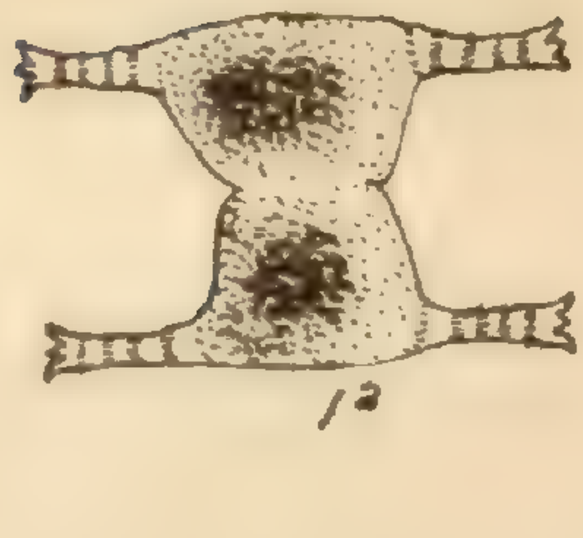
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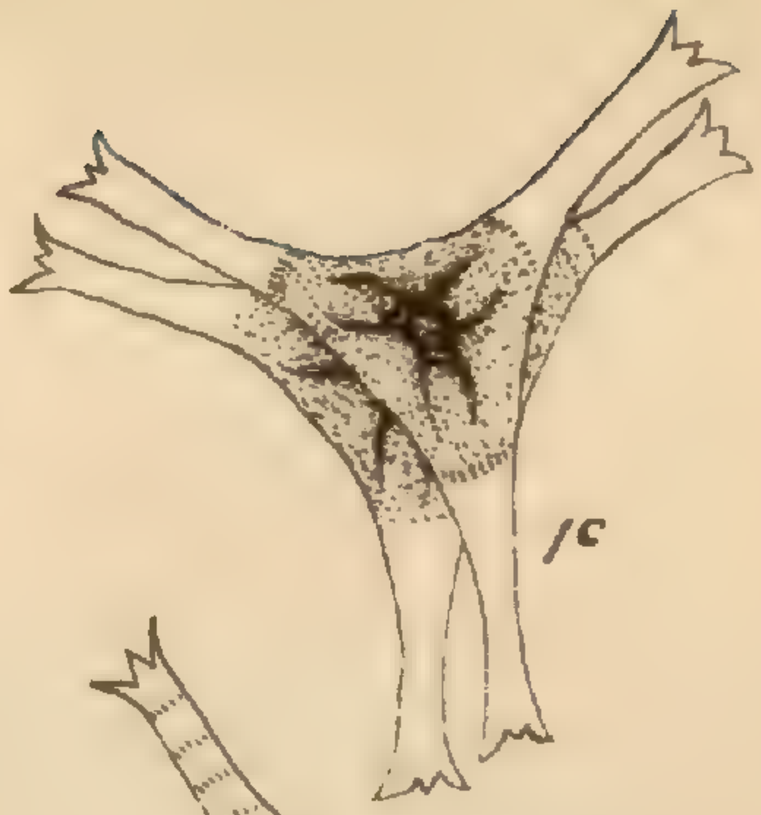
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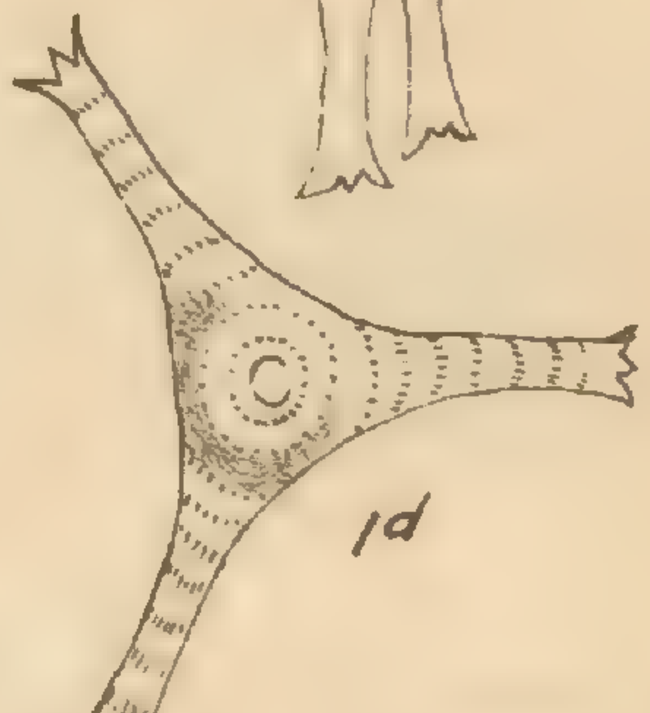
1b

1c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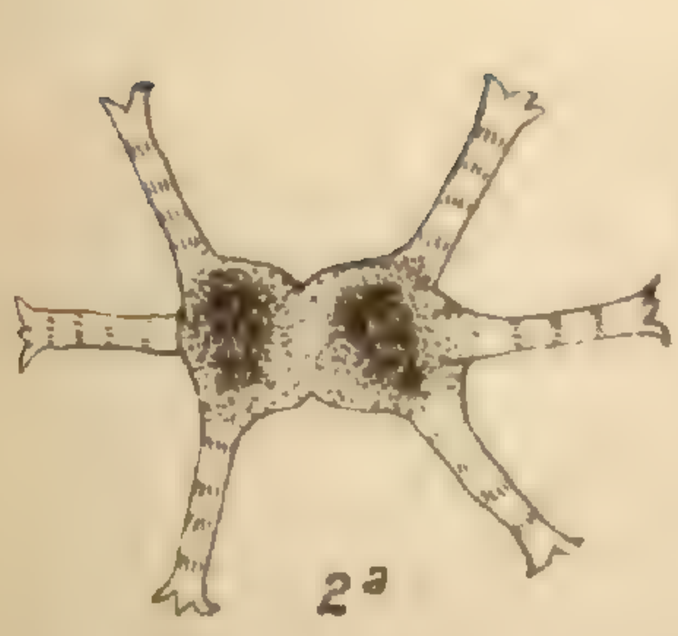
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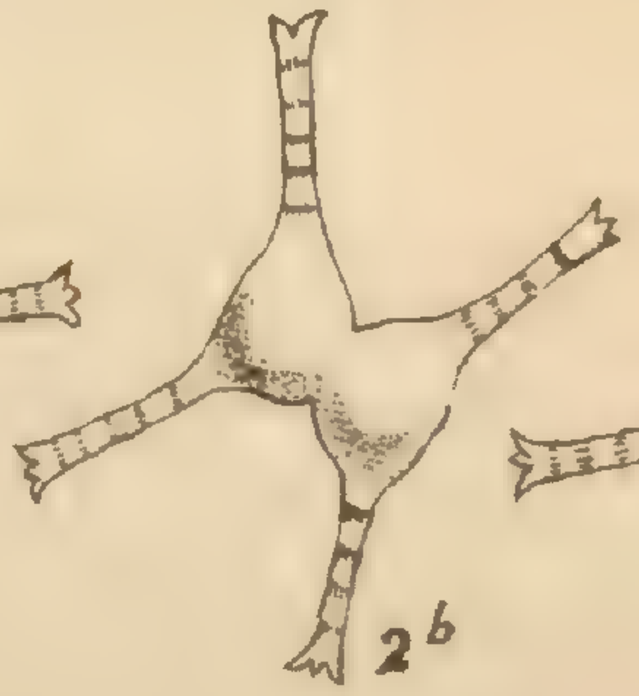
2a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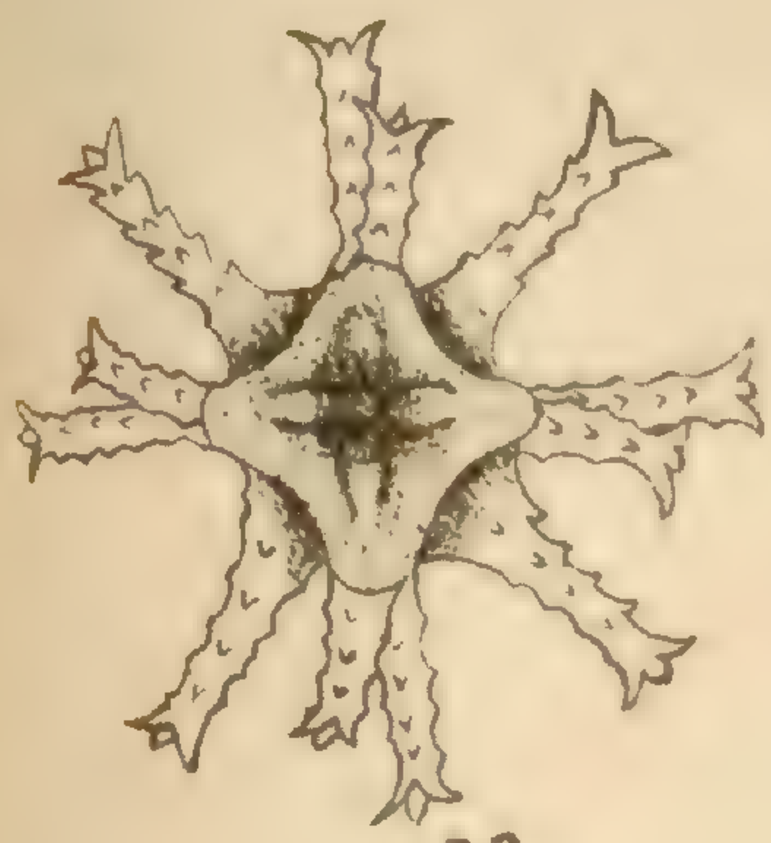
2c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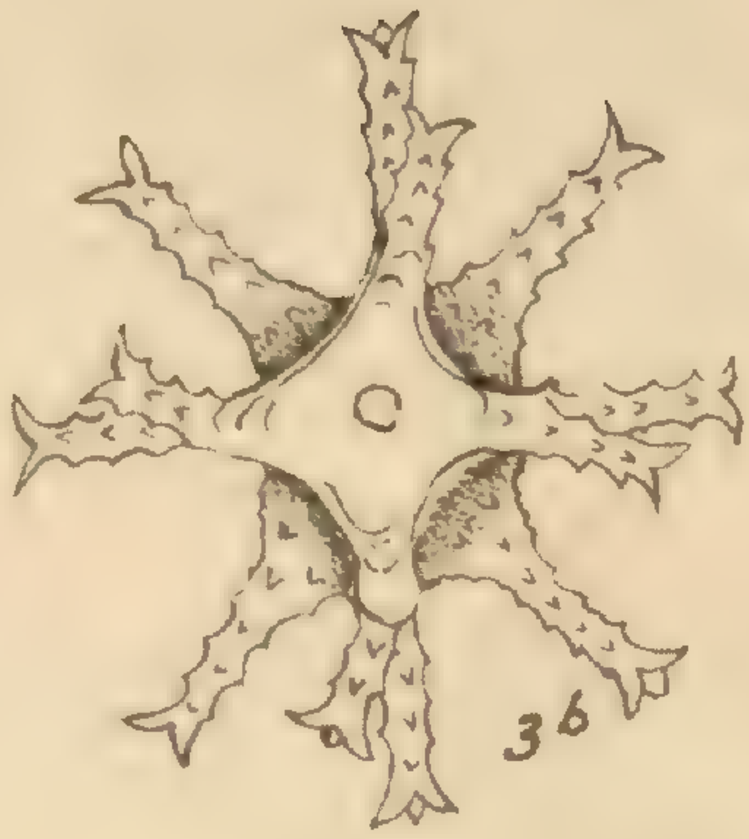
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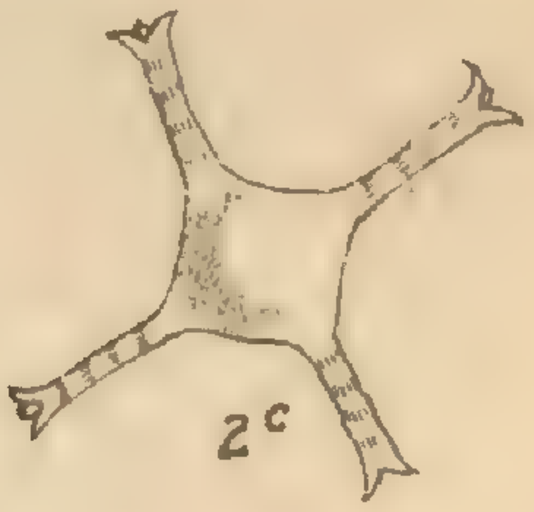

2c

4a

4b

4c

4d

4d

Plate XII.

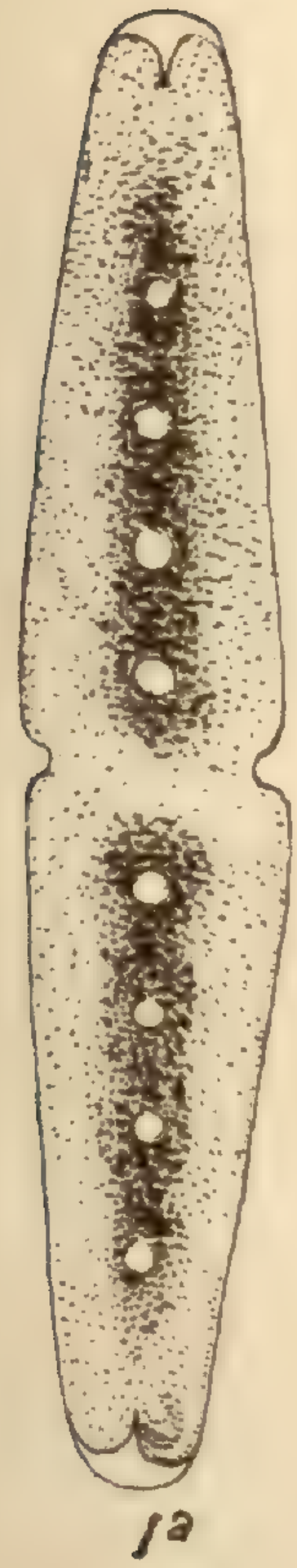
Fig. 1*a*.—Tetmemorus granulatus, *Breb*. Living cell.

Fig. 1*c*.—Tetmemorus granulatus, *Breb*. Empty cell.

Fig. 1*d*.—Tetmemorus granulatus, *Breb*. Zygospore.

Figs. 2*a*, 2*b*, 2*c*, 2*d*.—Staurastrum sexangulare, *Lund*.

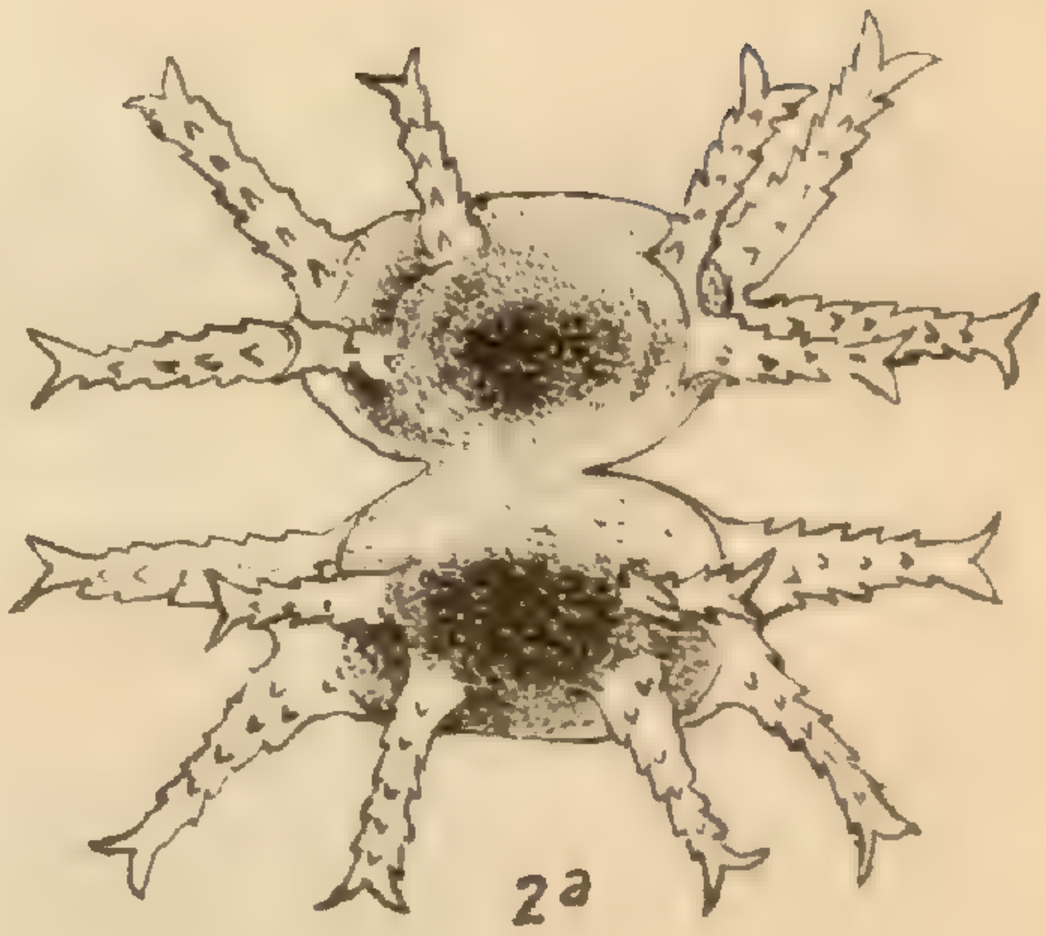
Pl. XII



1a

1c

1d



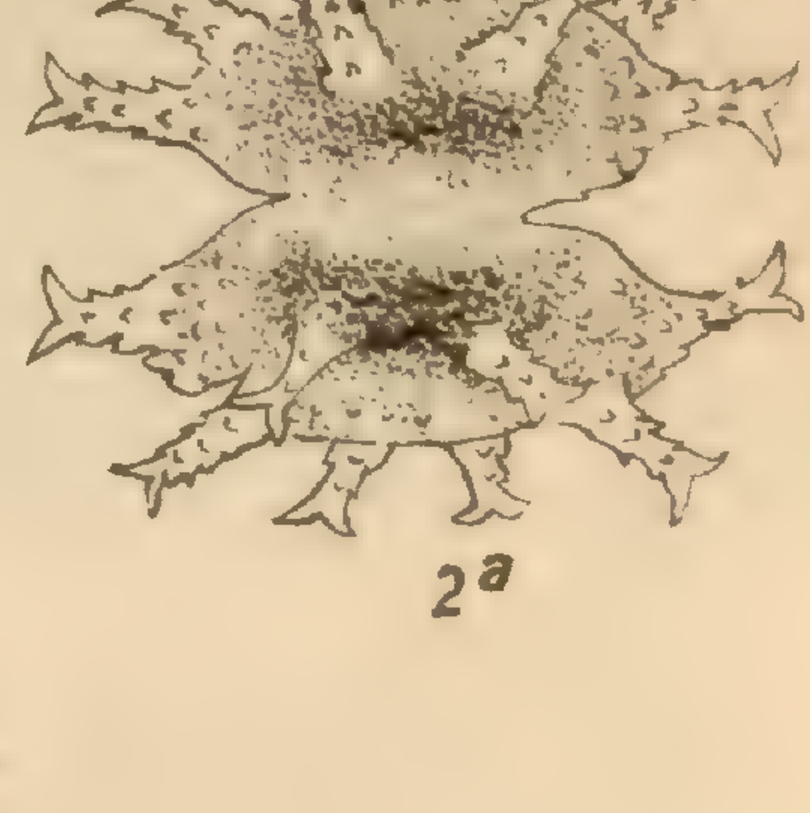
2a

2b

2a

2c

2c



2d

Plate XIII.

Figs. 1*a*, 1*b*, 1*d*.—Euastrum ansatum, var. maxima, n. var., *Borge*, x 270.

Figs. 2*a*, 2*b*.—Euastrum asperum, *Borge*, n. sp., x 740.

Fig. 3.—Kirchneriella lunata, *Schmid.*, x 740.

Fig. 4.—Micrasterias alata, *Wall*, x 390.

Figs. 5, 5*a*.—Desmidium bengalicum, forma, *Borge*, x 740.

Fig. 6.—Micrasterias oscitans, var. pinnatifida, forma, *Borge*, x 270.

Figs. 7*a*, 7*b*, 7*c*.—Euastrum rostratum, var. præmorsum, forma, *Borge*, x 740.

Figs. 8*a*, 8*b*, 8*d*.—Euastrum rostratum, var. præmorsum, forma, *Borge*, x 740.

Figs. 9, 9*a*.—Staurastrum retusum, var. granulatum, *Borge*, n. var., x 740.

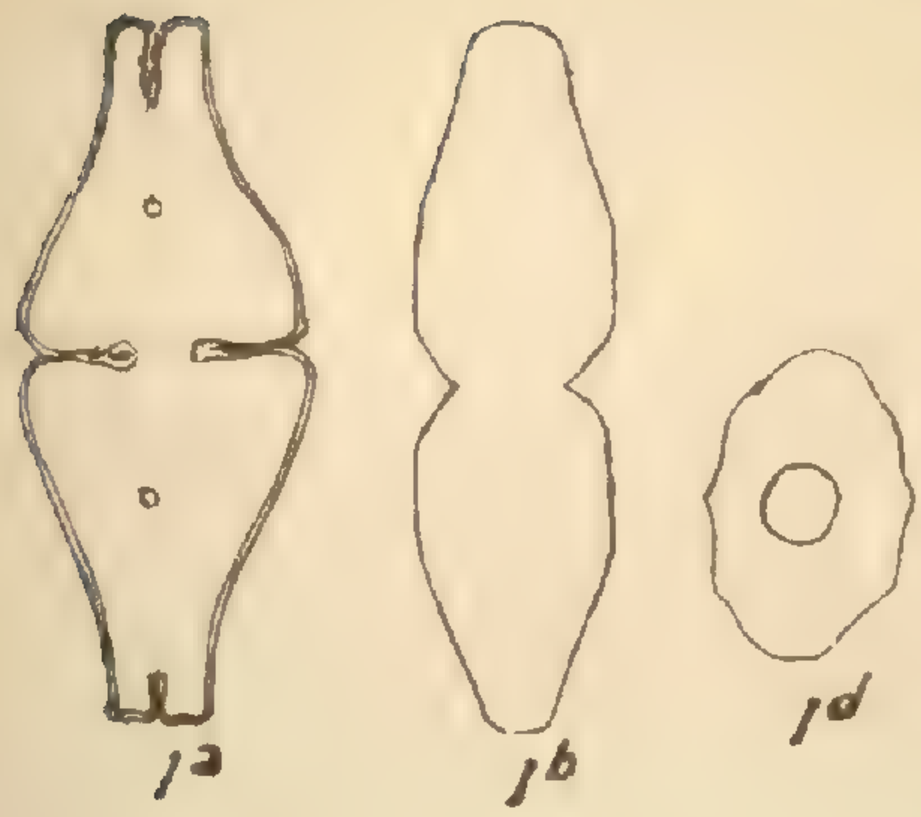
Figs. 10*a*, 10*b*, 10*c*.—Euastrum divergens, var. australianum, *Borge*, n. var., x 740.

Fig. 11.—Œdogonium sp., *Borge*, x 270.

Figs. 12, 12*a*, 12*b*.—Euastrum verrucosum, var. Mobii, *Borge*, n. var., x 390.

Figs. 13, 13*a*.—Euastrum spinulosum, var. ornatum, *Borge*, n. var., x 740.

Pl. XIII


1a

1b

1d

2a

2b

Plate XIV.

Fig. 1.—Euastrum verrucosum, var. Mobii, forma, *Borge*, x 390.

Figs. 2*a*, 2*c*.—Staurastrum elegans, n. sp., *Borge*, x 390.

Figs. 3*a*, 3*c*.—Staurastrum sexangulare, var. incurvum, *Borge*, n. var., x 740.

Figs. 4*a*, 4*c*.—Staurastrum bicorne, var. longebrachiatum, *Borge*, n. var. x 740.

Figs. 5*a*, 5*b*, 5*c*.—Xanthidium multicorne, *Borge*, n. sp., x 390.

Figs. 6*a*, 6*b*, 6*c*.—Xanthidium bifurcatum, *Borge*, n. sp., x 270.

Fig. 6*ap*.—Xanthidium bifurcatum. Apical lobes in vertical view.

Fig. 6*z*.—Xanthidium bifurcatum. A part of the zygote.

Figs. 7*a*, 7*d*.—Arthrodesmus apiculatus, forma, *Borge*, x 740.

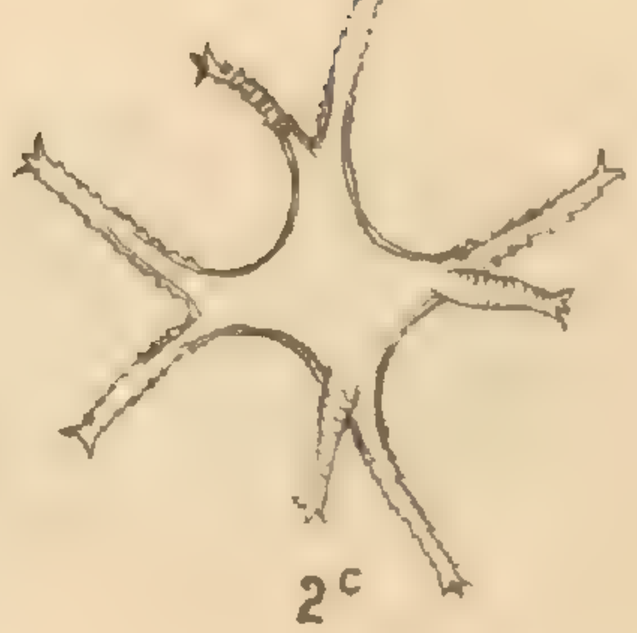
Figs. 8*a*, 8*d*.—Arthrodesmus convergens, forma, *Borge*, x 740.

Fig. 9.—Euastrum sp., *Borge*, x 740.

Pl. XIV

1

2a



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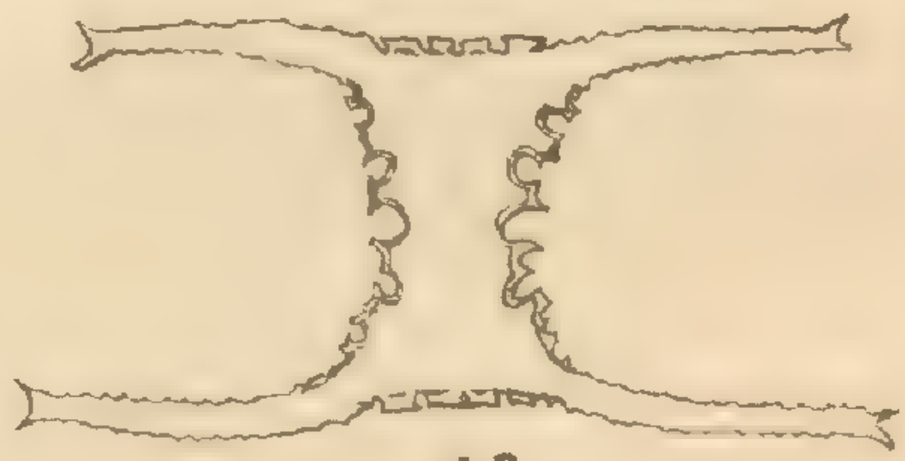
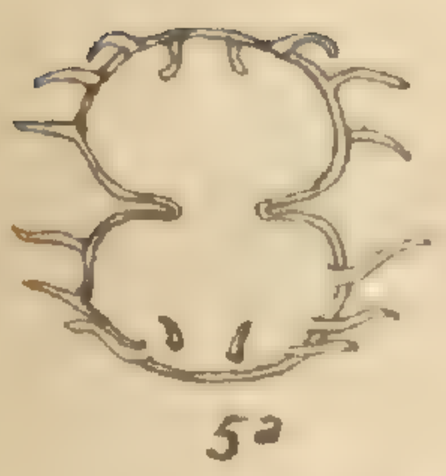


4a

4c

3a



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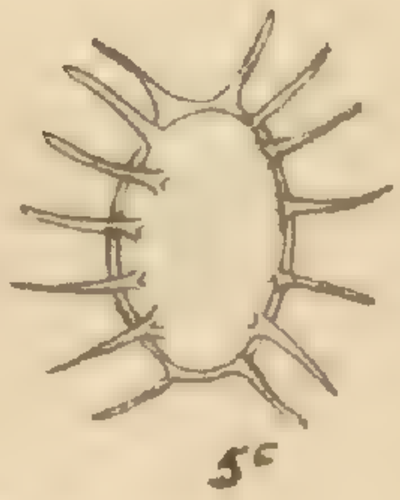

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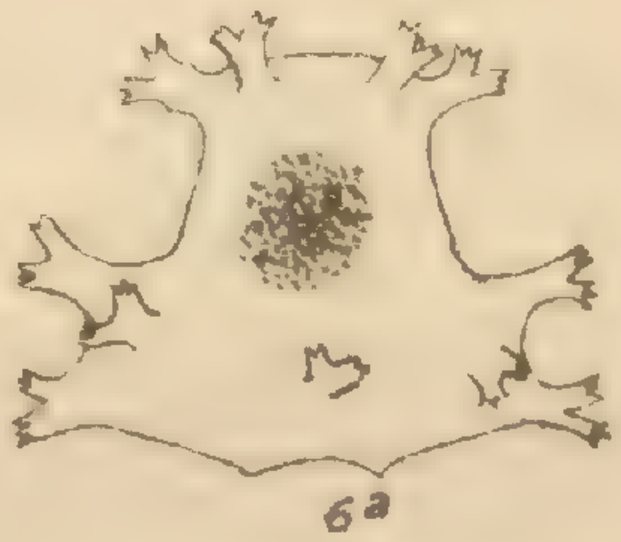


6a

6aa

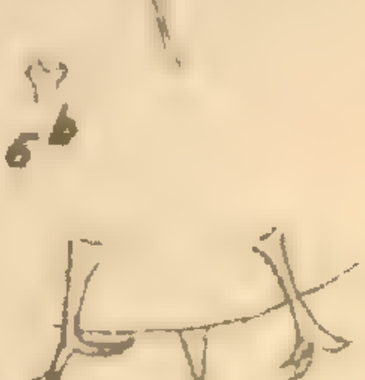
5b

6c

6b

9

6ap



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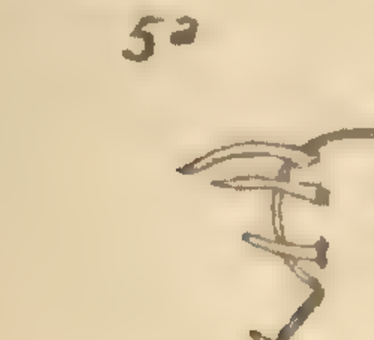


7a

7d

8d

8a

Plate XV.

Figs. 1*a*, 1*b*, 1*c*.—Xanthidium superbum, forma, *Borge*, x 740.

Fig. 2.—Cosmarium excavatum, forma, *Borge*, x 740.

Fig. 3.—Cosmarium venustum, forma, *Borge*, x 740.

Fig. 4.—Cosmarium excavatum, forma, *Borge*, x 740.

Figs. 5*a*, 5*b*, 5*c*.—Cosmarium denticulatum, *Borge*, n. sp., x 390.

Fig. 6.—Cosmarium pseudobroomei, *Wolle*, x 390.

Fig. 7*a*, 7*c*.—Cosmarium securiforme, *Borge*, n. sp., x 390.

Figs. 8*a*, 8*c*.—Cosmarium pseudoprotuberans, forma, *Borge*, x 740.

Figs. 9*a*, 9*d*.—Cosmarium Askenasyi, forma, *Borge*, x 390.

Figs. 10*a*, 10*b*, 10*c*.—Cosmarium dubium, *Borge*, n. sp., x 740.

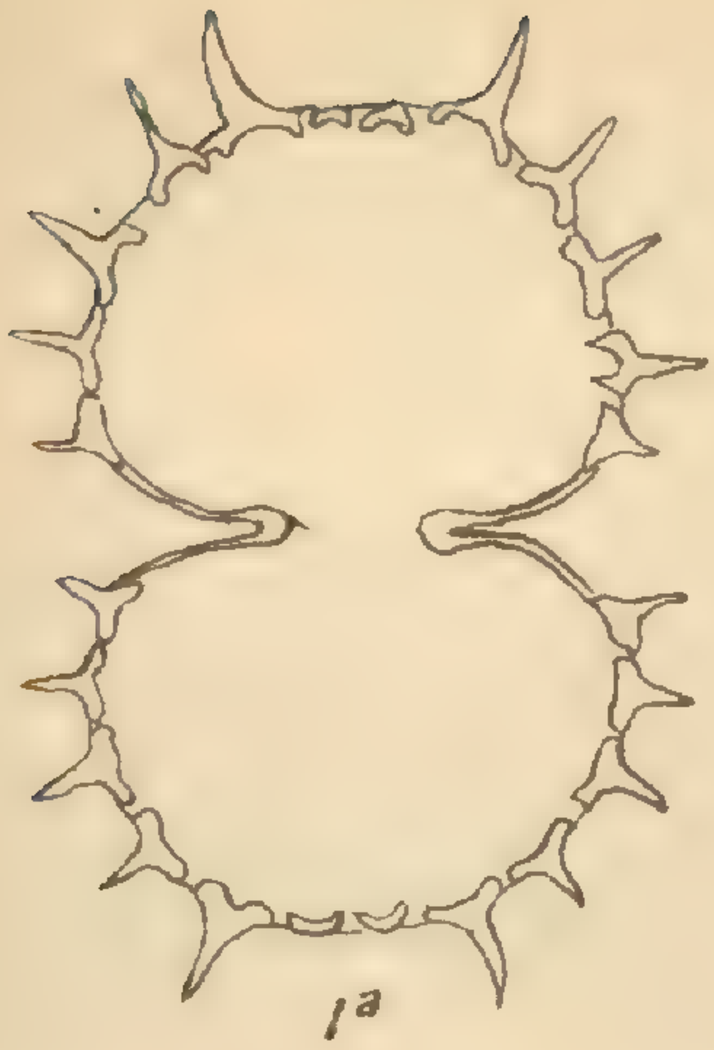
Figs. 11*a*, 11*c*.—Cosmarium binum, var. australiensis, *Borge*, n. var., x 740.

Fig. 12.—Euastrum sp., *Borge*, x 740.

Fig. 13.—Micrasterias sp., *Borge*, x 740.

Figs. 14*a*, 14*d*.—Cosmarium Askenasyi, forma, *Borge*, x 390.

PL.XV



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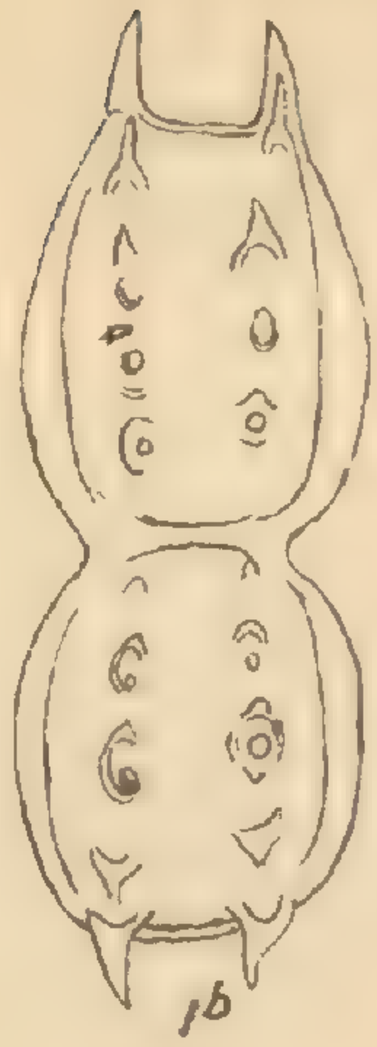

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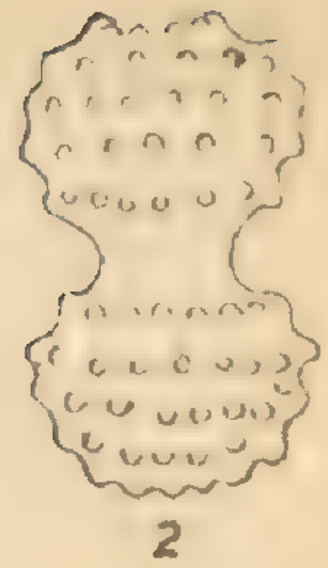

2

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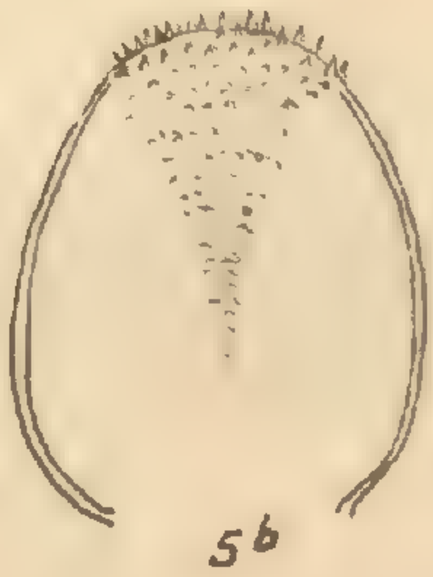
5c



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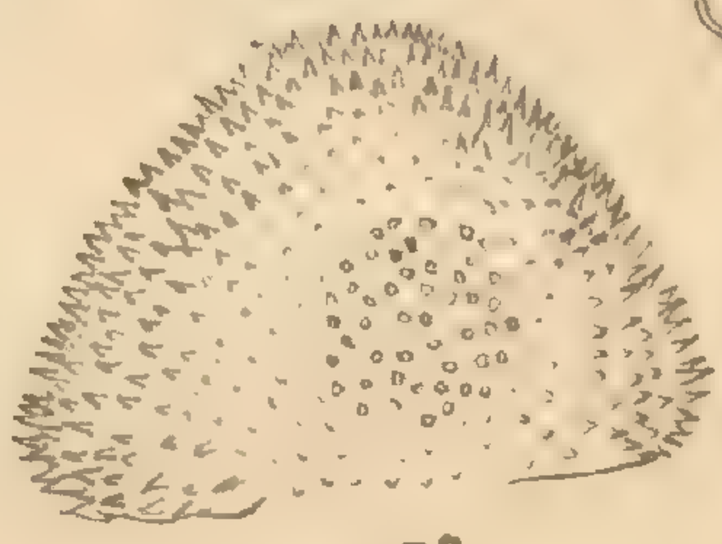


5a

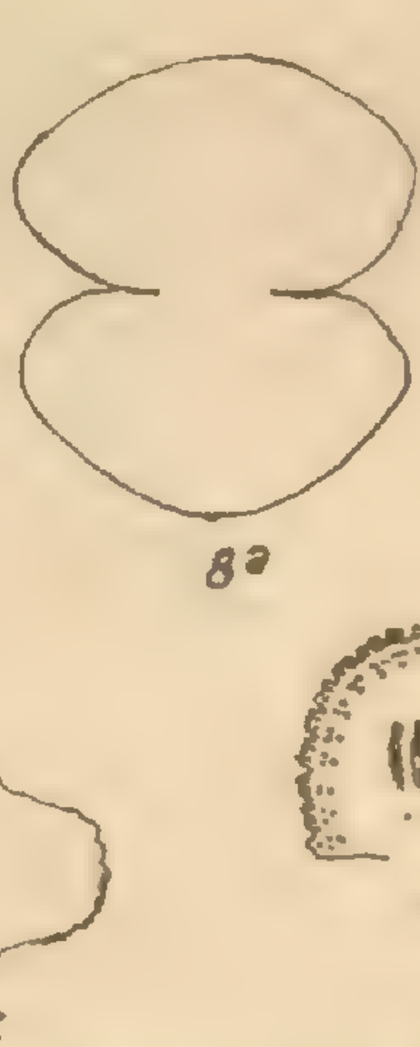
6

7c

7a

9d

9a



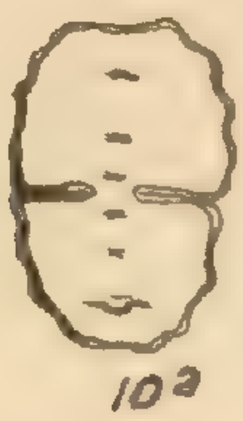
8a

8c

11a

11c

10b



10a

10c

12

13

14d

14a

Plate XVI.

Fig. 1.—Docidium nodosum, var. mammillata, *Borge*, n. var., x 740.

Fig. 2, 3.—Docidium nodosum, forma, *Borge*, x 740.

Fig. 4.—Docidium basiundatum, forma, *Borge*, x 390.

Fig. 5.—Docidium subundulatum, *Borge*, n. sp., x 270.

Fig. 6.—Docidium burmense, forma, *Borge*, x 270.

Fig. 7*a*, 7*b*.—Cosmarium angustatum, forma, *Borge*, x 740.

Fig. 8.—Docidium australianum, *Borge*, n. sp., x 270.

Fig. 9.—Docidium australianum, forma, *Borge*, x 270.

Fig. 10.—Docidium elegans, *Borge*, n. sp., x 390.

Fig. 11.—Docidium gracile, *Wittr.*, x 390.

Fig. 12.—Docidium nodosum, forma, *Borge*, x 740.

Fig. 13, 14.—Docidium cylindricum, forma (?), *Borge*, x 390.

Pl. XVI

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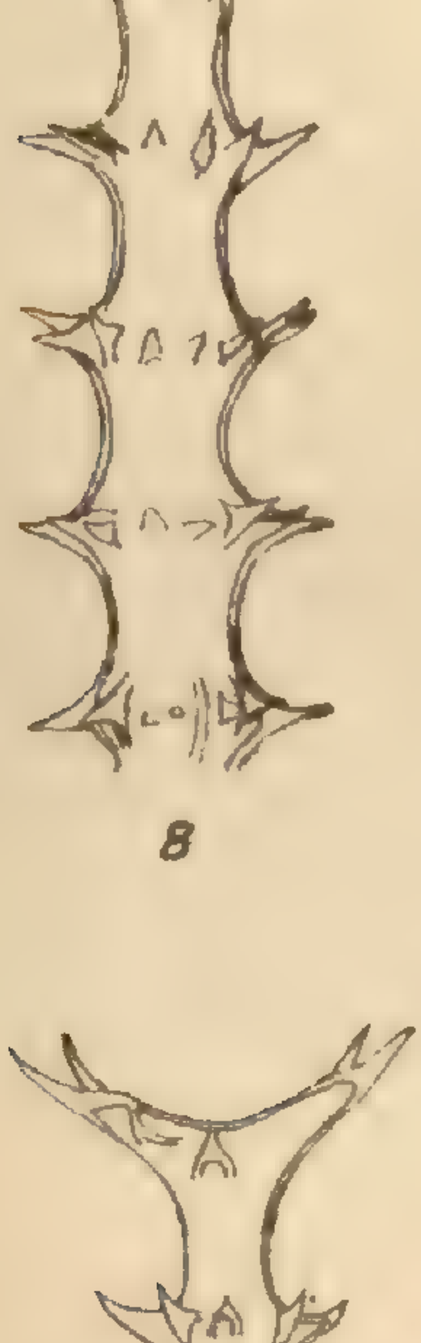


10

11

Plate XVII.

Fig. 1. –Docidium verticillatum, var. ornatum, *Borge*, n. var., x 390.

Fig. 1*a*.—Docidium verticillatum. The lateral protuberance in lateral veins, x 740.

Fig. 1*b*.—Docidium verticillatum (?), x 740.

Figs. 2, 2*c*, 2*d*.—Docidium horridum, *Borge*, n. sp.

Fig. 3.—Docidium œdematum, *Turn.*

Figs. 4*a*, 4*c*.—Euastrum verrucosum, var. Wallichianum, *Turn.*

Fig. 5.—Docidium cylindricum, *Turn.*

Fig. 6.—Staurastrum rectangulare, *Borge*, n. sp., x 740.

Figs. 7*a*, 7*b*.—Staurastrum bengalense, *Turn.*, x 300.

Figs. 8, 8*a*, 8*b*.—Desmidium Baileyi, forma genuina, *Nordst.*

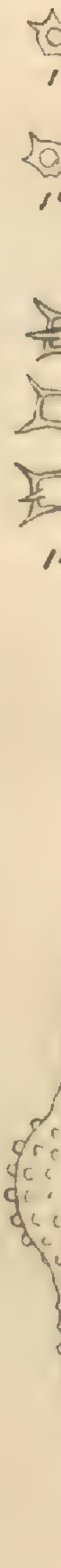
Figs. 10*a*, 10*b*.—Desmidium Baileyi, forma genuina, *Nordst.*

Fig. 9.—Cosmarium excavatum, forma *Nordst.*

Figs. 11*a*, 11*b*.—Staurastrum Maskelli, *Turn.*

Figs. 12*a*, 12*b*.—Staurastrum retusum, *Turn.*

Pl. XVII



Queensland.

DEPARTMENT OF AGRICULTURE, BRISBANE.

BOTANY BULLETIN No. XVI.

JUNE, 1903.

CONTRIBUTIONS TO THE QUEENSLAND FLORA.

WITH ONE PLATE.

BY

F. M. BAILEY, F.L.S.,

COLONIAL BOTANIST.

The Bulletins of this Department will be sent free to such Individuals interested as may request them. Address all applications to "The Under Secretary for Agriculture, Brisbane."

BRISBANE:

BY AUTHORITY: GEORGE ARTHUR VAUGHAN, GOVERNMENT PRINTER, WILLIAM STREET

1903.

Mo. Bot. Garden

PREFATORY NOTICE.

The lapse of time since the publication of my last Botany Bulletin, No. XV. (January, 1898), seems to call for some explanation. The reason has been that all additions to the State's Flora have either been given in the pages of the *Queensland Agricultural Journal*, or worked into "The Queensland Flora" as that work progressed. The necessity for issuing the present has been brought about by the publication, in Vol. XLII. of the Hedwigia, of the fungi collected by Drs. L. Diels and E. Pritzel, during their recent botanical collecting trip through Australia. Von P. Hennings, who determined their fungi, found a large number of them to be new to science, and as these were mostly obtained in Queensland, it becomes my duty to publish descriptions of them, and thereby bring my publications on this Order up to date. I have also added to the above some of my own determinations of fungi and other plants.

F.M.B.

30th June, 1903.

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BOTANY:

CONTRIBUTIONS TO QUEENSLAND FLORA.

Order LORANTHACEÆ.

LORANTHUS, Linn.

L. tenuifolius, *Bail.* (Foliage of thin texture.) Stem short, divaricate, dichotomously-branched, the lower portion almost corky, the branches with prominent lenticels. Leaves glabrous, opposite of thin texture, 2½ to 4 in. long, 1½ to 2½ in. broad, apex blunt, the base rounded to a petiole of 2 to 3 lines, which is more or less winged by the decurrent lamina costa, main nerves and reticulate veins prominent. Inflorescence lateral, shortly pedunculate cymes, of red flowers, glabrous except perhaps for a few appressed minute hairs on the free portion of the filaments and style. Calyx-limb of 5 short blunt teeth. Corolla-tube slender, about 1 in. long, free portions erect for about 3 lines, where the filaments separate from them, then suddenly reflexed, the free portion very narrow. Anthers adnate, erect, nearly 2 lines long, narrow. Style slightly exceeding the anthers, near the ovary sharply angular.

Hab.: Mount Alexandra. Specimens received from Mr. Howard Newport, of Kamerunga, without the collector's name. November, 1902.

Order ORCHIDEÆ.

GEODORUM, Jackson.

G. dilatatum, *R. Br.* var. Pseudobulbs conical-globose, about 1¼ in. high. Leafy stems about 6 in. high, usually bearing 3 leaves and a lower one without lamina. Leaves plicate; lanceolate, about 1 ft. long. Scape about 1 ft. high, flowers of raceme few, the raceme at first decurved becoming erect as the flowers expand. Bract at base of raceme and below about 2 in. long, the upper ones much smaller. Pedicels angular, 3 to 4 lines long. Lateral sepals somewhat falcate, about 4 lines long, linear, apiculate, the dorsal one straight, longer, and broader. Petals obtuse, long as dorsal sepal, broad, blushed. Labellum broadly-saccate, about 5 lines long, very obtuse, and emarginate at the end, blushed and marked with dotted purplish lines, the disk stained with yellow in the centre, but without plates or calli, only marked with more or less prominent veins. Column short and broad, slightly red-stained at the base.

Hab.: Vrylia Point, Gulf of Carpentaria.—*J. F. Bailey.*

Order GRAMINEÆ.

PANICUM, Linn.

P. nematostachyum, *Bail.* (Branches of panicle thread-like.) Stems from a shortly creeping rhizome, somewhat bulbose at the base, about 1 .ft. high to the inflorescence. Leaves flat, softly pubescent. Sheaths loose, the upper one much the longest; ligula large, scarions almost entire, 1 line high; lamina 4 to 6 in. long, about 3 lines broad. Inflorescence glabrous, peduncle about 1 ft. long, panicle about 6 in. long, branches filiform, 6 to 10 in. long; the lower ones forming a whorl of 6 to 7 branches, the others scattered and numerous. Spikelets rather distant along the rhachis, dark, scarcely more than 1 line long; solitary or in pairs, very shortly pedicellate, but one pedicel longer than the other. Outer glume purple, minute, almost orbicular or truncate, 2nd prominently 3-nerved, nearly 1 line long, 3rd 5-nerved. Fruiting glume acuminate, brown, with very faint transverse lines.

Hab.: Irvinebank.—*F. Bennett.*

This new species is allied to *P. cœnicolum, F. v. M.*, and the *var. leiostachyum* of *P. papposum, R. Br.*

ERAGROSTIS, Beauv.

E. Brownii, *Nees., var.* schistacea. Erect, about $2\frac{1}{2}$ ft. high; lower leaves flat, upper ones nearly erect, narrowing to 1 thread-like point. Inflorescence about 10 in. long, consisting of a spike of numerous ovate clusters of dark-slate-coloured spikelets, the clusters seldom more and often less than $\frac{1}{2}$ in. long.

Hab.: Irvinebank.—*F. Bennett.*

Order FUNGI.

HYMENOMYCETES.

Mycelium floccose, giving rise at once to a distinct hymenium, or producing a variously shaped, naked, or volvate receptacle, even, or bearing on its upper or under surface various folds, plates, prickles, &c., clothed with fertile hymenial cells. Spores naked, mostly quaternate, on distinct spicules.—*Cooke*, in Handb. Austr. Fungi i.

AGARICINI.

Hymenium inferior, spread over easily divisible gills or plates, radiating from a centre or stem, which may be either single or branched.—*Cooke l.c.*

AGARICUS, Linn.

A. (Pleurotus) limpidus, *Fries. Cooke*, in Handb. Austr. Fungi 33, Illus. t. 276b. Pileus rather fleshy, obovate or kidney-shaped, about 1 in. broad, even, smooth, white, hygrophanous, attenuated behind into a rudimentary stem; gills linear, crowded, decurrent at the base, white.—*Cooke l.c.*

Hab.: On dead wood, Eumundi.—*E. Pritzel.*

POLYPOREI.

Pores rounded or angular, sometimes sinuous or torn, bearing on the inner surface the tetrasporous sporophores and cystidia.—*Cooke l.c.*

FOMES, Fries.

F. versicolor, *P. Henn.* Hedw. xlii. 75. Pileus hooflike, indistinctly sulcate-zonate, reddish-brown, blackish at the base, cracked, crustaceous, somewhat glossy, about 4 in. long and 2 in. broad, substance cinnamon-coloured, woody; hymenium convex; pores rotundate-angular, about 3 mm. diam., golden, afterwards rust-coloured; spores broad, ellipsoid, yellowish-brown, smoothish, 4-4½ x 3½-4 μ.—*P. Hennings l.c.*

Hab.: Russell River.—*E. Pritzel.*

POLYSTICTUS, Fries.

P. tabacinus, *Mont. Sacc.* Syll. vi. 280. Imbricate; pilei ferruginous, bay, coriaceous, thin, rigid, effused and reflexed, shell-shaped, tomentose, concentrically zoned, from 1½ to 3 in. broad, margin acute, paler; pores medium size, torn or toothed, at length of the same colour. *Cooke*, in Handb. Austr. Fungi 151.

Hab.: Kuranda, on dead wood.—*E. Pritzel.*

PORIA, Pers.

P. sinuosa, *Fries. Cooke*, in Handb. Austr. Fungi 156. Broadly effused, adnate, dry, springing from an evanescent mycelium, white, then yellowish, about 2 lines thick; pores broad, flexuous, various, acute, torn, spores 6 x 2-3 μ.—*Cooke l.c.*

Hab.: Eumundi, on dead stems.—*E. Pritzel.*

HYDNEI.

Hymenium inferior, or on both sides, spread over the surface of spines, teeth, tubercles, crests, or persistent papilla.—*Cooke l.c.*

GRANDINIA, Fries.

G. cinereo—violacea, *P. Henn.* Hedw. xlii. 74. Crustaceous, innate, broadly effuse, emarginate, sometimes cracked, contexture cinnamon-coloured, hymenium a grey-violet, pruinose, densely granulate, granules wart-like, subfimbriate, about 60-100 μ; spores subglobose, 3-4 μ, smooth.—*P. Hennings l.c.*

Hab.: Eumundi.—*E. Pritzel.*

THELEPHOREI.

Hymenium inferior, or on both surfaces, coriaceous or waxy, even, rarely ribbed or papillose, spores continuous, hyaline or coloured.—*Cooke l.c.*

CLADODERRIS, Pers.

C. Pritzelii, *P. Hennings* Hedwigia xlii. 74. (After Dr. E. Pritzel.) Pileus cæspitose, imbricate, sessile, decurrent to the base, coriaceous, conchate, sinuose-crispate, upper side densely tomentose, zonate-sulcate, rugulose, margin acute, cinnamon-coloured, sinuose, usually about 4 in., $2\frac{1}{2}$ in. broad; hymenium of a rusty-grey colour; ribs radiatingly-branched, sulcate rugose, verrucose, velvety; spores subglobose, punctulate, hyaline, smooth, $3\frac{1}{2}$-4 μ.—*P. Henn l.c.*

Hab.: On dead wood, Kuranda.—*E. Pritzel.*

HYMENOCHÆTE, Lev.

H. leonina, *Berk.* Curt. Cuban Fungi No. 423. *Cooke*, in Grev. viii. 148. *Sacc.* Syll. Fung. vi. 597. Wholly resupinate, croceo-ferrugineous, margin tomentose; uneven, inseparable, not cracked; bristles somewhat sharp, 70 x 10 μ.—*Soc. l.c.*

Hab.: Eumundi, on Sterculia.—*E. Pritzel.*

CORTICIUM, Fries.

C. calceum, *Fries. Cooke*, in Handb. Austr. Fungi 193. Broadly effused, adglutinate, wavy, smooth, white, margin similar; hymenium even, cracking when dry, pallid; spores cylindrically ellipsoid, 8 x 4 μ.—*Cooke l.c.*

Hab.: Upper Barron River.—*E. Pritzel.*

TREMELLINEÆ.

Homogeneous, gelatinous, collapsing when dry, reviving when moistened.—*Cooke*, in Handb. Austr. Fungi 205.

AURICULARIA, Bull.

A. delicata, *Fries. P. Henn.* Engl. Bot. Jahrb. xviii. 24.

Hab.: On dead wood, Kuranda.—*E. Pritzel* (*P. Hennings* Hedw. xlii.).

DACRYOMYCES, Nees.

D. deliquescens, *Duby. Cooke*, in Handb. Austr. Fungi 209. Subrotund, rooting, convex, immarginate yellowish, at length contorted, hyaline $\frac{1}{2}$ line broad; spores oblong, curved, obtuse, triseptate, 15-16 x 6-7 μ, four guttulate, hyaline.

Hab.: On dead wood, Kuranda.—*E. Pritzel* (*Cooke l.c.*).

GASTROMYCETEÆ.

Terrestrial, rarely growing on wood, membranaceous, coriaceous, or fleshy, enclosed in a variable receptacle or peridium; fructification consisting of basidii spores, enclosed until maturity in the peridium; spores continuous, spherical or ellipsoid, hyaline or coloured.—*Cooke*, in Handb. Austr. Fungi 211.

PHALLOIDEÆ.

Fungi between fleshy and gelatinous, erumpent from a volva; hymenium slimy, rather fleshy, and deliquescent.—*Cooke l.c.*

ITHYPHALLUS ATROMINIATUS, *Bail.*

ITHYPHALLUS, Fries.

I. atrominiatus, *Bail.* (the stem a dark vermilion colour), with Plate. Plant attaining the height of 5 to 6 in., stem of a dark vermilion, lacunose and hollow, slightly tapering from about the middle into the cap. Pileus about 1 in. long, narrow-conical, thin and closely fitting the stem, but except at the top free from it, sometimes pervious, sometimes closed at the apex, quite smooth when fresh, sporiferous pulp dark-olive. Volva about 1¼ in. long, rather narrow, white like the mycelium.

Hab.: Toowong, on rich garden soil.—*Mrs. J. F. Bailey.*

ASCOMYCETEÆ.

Fruit consisting of sporidia, mostly definite, contained in asci, springing from a naked or enclosed stratum of fructifying cells, and forming an hymenium or nucleus.—*Cooke*, in Handb. Austr. Fungi 248.

PEZIZEÆ.

Cup-shaped or disc-shaped, rarely inflated; stipitate or sessile; excipulum fleshy, or rather coriaceous, or waxy.—*Cooke l.c.* 252.

HELOTIUM, Fries.

H. Kurandæ, *P. Henn.* Hedw. xlii. 85. Cups membranaceous, stipitate, orange-coloured, concave-discoid, smooth, about 1½-2 mm. diam., stipes subclavate, concolorous, fuscus at the base, about 0·5 mm. long, disk nearly flat, orange; asci clavate, apex obtuse rotundate, 8-spored, 120-160 x 10-12 μ, paraphyses hyaline, guttulate, about 1½ μ thick; spores oblong, fusoid; subacute and unequallysided at both ends, eguttulate, 20-24 x 4-5 μ.—*P. Hennings l.c.*

Hab.: Kuranda.—*E. Pritzel.*

ERINELLA, Sacc.

Caps stipitate or sessile, villose, waxy, minute; sporidia filiform, hyaline.—*Cooke*, in Handb. Austr. Fungi 267.

E. Pritzeliana, *P. Henn.* Hedw. xlii. 86. Cups membranaceous-ceraceous, stipitate, white outside, shortly hairy, hairs curved, 10-20 x 3½ μ, yellowish, disk pale yellow 0·6-0·8 μ; stipes terete, about 0·3-0·5 x 0·1 μ; asci cylindric-clavate, apex obtuse, 8-spored, 80-90 x 5-7 μ, paraphyses filiform, septate, guttulate, 2 μ thick; spores conglobate, filiform, flexuose, obtuse at both ends, pluriguttulate or obsoletely septate, 40-60 x 0·5-0·6 μ.—*P. Hennings l.c.*

Hab.: Russell River.—*E. Pritzel.*

BULGARIEÆ.

Cups top-shaped, cup-shaped, or discoid, gelatinous, becoming somewhat horny or cartilaginous.—*Cooke*, in Handb. Austr. Fungi 269.

ORBILIA, Fries.

O. fusco-pallida, *P. Henn.* Hedw. xlii. 85. Cups scattered on leaf petioles, sessile, gelatinous, subhorny when dry, subhemispherically depressed, afterwards discoid, brownish smooth, about 0·5-1 mm.; disc plane, pale, marginate; asci subfuscoid, apex subacute, 30-38 x 2-2½ μ, 8-spored, paraphyses filiform, hyaline or incrassated; spores oblique monostichous or subdistichous, fusoid, both ends acute, hyaline, continuous, 3-4 guttulate, 4-5 x 0·5 μ.—*P. Hennings i.c.*

Hab.: On the petioles of a Lauraceous plant at Eumundi.—*E. Pritzel.*

BULGARIA, Fries.

Cups at first closed, obconic or subglobose, the outside rough, glutinose-pulpy inside. Asci cylindric-clavate, paraphyses, 4-8-spored. Sporidia ellipsoid-oblong, brown.

B. cyathiformis, *P. Henn.* Hedw. xlii. 85. Cup gelatinous, cæspitose, stipitate, at first subturbinate, closed, afterwards cuplike, margined, 5-14 mm. diam.; outside dark-brown, tomentose, threads even to 250 μ long, 3-4 μ thick, rusty, stripes often 5 mm. long, about 3 mm. thick, subcylindrically-compressed, concolorous, disc concave, dark-cinnamon, margins involute, hypothecium pale-brown, gelatinous even to 2 mm. thick; asci cylindrical-clavate, apex flattened, 8-spored, 270-300 μ long, sporiferous portion 60-90 x 13-18 μ; paraphyses copious, oboval, filiform, pleuriguttulate, tawny, 3-4 μ thick, the points scarcely incrussated; spores oblique monostichos, ellipsoid, obtuse at both ends, 1 guttulate 10-14 x 6-9 μ, hyaline, epispore subfuscidulus, smooth.—*P. Hennings l.c.*

Hab.: Eumundi.—*E. Pritzel.*

GYMNOASCACEÆ.

Effuse, byssoid, superficial, formed by naked asci crowded together side by side.—*Cooke*, in Handb. Austr. Fungi. 273.

Hysteriaceæ.

Receptacle more or less elongated, coriaceous or carbonaceous, exposing the hymenium by longitudinal fissure.—*Cooke l.c.* 274.

GLONIUM, Muhl.

Perithecia emergent, linear, elongated, rarely oblong or orbicular, often radiately disposed, carbonaceous or horny, membranaceous, dehiscing with a fissure. Asci ovoid-ellipsoid, rarely cylindrically clavate; sporidia uniseptate, hyaline, rarely at length brownish.—*Cooke l.c.*

G. cypericola, *P. Henn.* Hedw. xlii. 84. Perithecia few, oblong, convex, black, about 0·5-0·7 mm. long, straight, crack narrow, lips obtuse; asci clavate, apex obtuse, 8-spored, 25-35 x 5½-7½ μ; paraphyses filiform, hyaline, 0·5 μ thick; spores distichous, clavate, or oblong obtuse, at first many spotted, at length with a septa in the middle, greenish-hyaline, 5-7 x 2½ μ.—*P. Hennings l.c.*

Hab.: Eumundi, on a Cyperaceous plant.—*E. Pritzel.*

PYRENOMYCETEÆ.

Perithecia fleshy, coriaceous, carbonaceous, or membranaceous, wholly enclosing the hymenium, usually pierced at the apex.—*Cooke*, in Handb. Austr. Fungi 277.

NECTRIÆ.

NECTRIA, Fries.

N. episphæria, *Tode. Fries* S. Veg. Sc. 388. *Sacc.* Syll. Fung. ii. 497. Perithecia gregarious or scattered, superficial, subspheroid, collapsing, soon subcompressed, ostiola papillate, soft, smooth, blood-coloured, 180 μ broad; asci cylindrical, 50-60 x 5-6, 8-spored; sporidia oblique monostichous, ellipsoid or subellipsoid, slightly unequalsided, 1-septate, slightly constricted, hyaline, or pinkish, 7 to 10 x 4-5; paraphyses tender and somwhat branched.—*Sacc. l.c.*

Hab.: Upper Barron River, on Hypoxylon.—*E. Pritzel.*

HYPOMYCES, Fries.

H. stereicola, *P. Henn.* Hedw. xlii. 79. Mycelium orange-coloured, crustaceous-effuse, hyphæ yellow or subhyaline, septate, branching, about 3-4 μ thick; conidia subglobose orange, punctulate within, $2\frac{1}{2}$-3μ; perithecia scattered or gregarious, free, ovoid or subglobose, citron-coloured; smooth, points papillate, palish, 130-180 x 120-150 μ; asci cylindrical, apex obtuse, 8-spored, 40-50 x 2-$2\frac{1}{2}$ μ; spores monostichos, fusoid, acute at both ends, at first continuous guttulate, afterwards with a middle septa, not constricted, $4\frac{1}{2}$-$5\frac{1}{2}$ x $1\frac{1}{2}$-2 μ.—*P. Hennings l.c.*

Hab.: Upper Barron River, on *Stereum lobatum, Fries.—E. Pritzel.*

PARANECTRIA, Sacc.

Parithecia globose, tender-membranous, pretty-coloured, sub-papillate. Asci 8-spored. Sporidia cylindraceo-sigmoidea, setigerous at both ends, 3-septate, hyaline.—*Sacc.* Syll. Fung. ii. 552.

P. Pritzeliana, *P. Henn.* Hedw. xlii. 79. Parithecia aggregate, subglobose-ovoid, vermilion, dense furfuraceous-squamose, hyphæ about 25-45 x 3 μ, apex subcinerous papillate, about 200-250 μ, context cells rotundate-polyedric, about 15-20 μ diam., scarlet, asci fusoid, subacute at each end, 8-spored, 60-80 x 14-20 μ; spores conglobate or subtristichos, fusoid-cylindrical, 3-septate not constricted, 30-42 x 4-5 μ, hyaline, the base or each end setulose filiform, 30-45 x 2 μ.—*P. Hennings l.c.*

Hab.: Russell River.—*E. Pritzel.*

GIBBERELLA, Sacc.

G. Saubinetii, *Mont. Cooke*, in Handb. Austr. Fungi 282. Perithecia gregarious, confluent in tufts and growing together, somewhat membranaceous, warted, at length flaccid, plicate, ovoid, contracted

at the base as if pedicellate, blue, 200-300 x 170-200 μ, papillate; asci oblong-lanceolate, 60-76 x 10-12 μ. Sporidia fusiform, curved or straight, rather acute, 3-septate, scarcely constricted, hyaline, 18-24 x 4-5 μ.—*Cooke l.c.*

Forma Calami, *P. Henn.* Hedw. xlii. 79. Perithecia gregarious, subconoid about 150-180 μ, atroviolaceous, hyphæ dusky-hyaline, septate, about 5 μ thick; asci clavate about 70 μ long, sporiferous portion 30-50 x 3-10 μ; spores districhous, dusky, curved, 3-septate, hyaline, 20-23 x 1-4½ μ.—*P. Hennings l.c.*

Hab.: Upper Barron River, on leaves of a Calamus (Lawyer cane).—*E. Pritzel.*

MEGALONECTRIA, Speg.

Perithecia globose, somewhat soft, pretty coloured, pillulate, asci 8-spored, sporidia ovate-oblong, murally-septate, hyaline.—From *Sacc.* Syll. Fung. ii. 560.

M. polytricha, *Schwein, var* australiensis, *P. Henn.* Hedw. xlii. 79. The asci are considerably smaller, 12-17 μ in diameter, the spores smaller, 14-20 x 7-10 μ, 3-5-7-septate, wall-like structures, ellipsoid or fusoid when in a fully ripe condition. Generally the fungus agrees with the American specimens in other characteristics.—*P. Hennings l.c.*

Hab.: Cairns.—*E. Pritzel.*

HYPODERMA, DC.

Perithecia innate, oblong or ellipsoid, thin, membranaceous, subdimidiate, crack longitudinally dehiscing. Asci clavate. Sporidia bacillar, guttate or pluriseptate much shorter than the ascus hyaline. Paraphyses filiform. Spermogonia orbicular, at length wholly separating. Spermatia simple, minute.—*Sacc.* Syll. Fung. ii. 784.

H. virgultorum, *DC. Sacc. l.c. Hysterium Rubi,* Pers. Subinnate in a longitudinal position, elongate, acute, smooth, shiny, black, at length gaping, grey inside; asci clavate-oblong, long stipitate, 8-spored, filiform-paraphysate, 90 x 9; sporidia fusoid-elongate, somewhat obtuse, straight or slightly curved, 2-cellular, 2-nucleate, hyaline, 21 x 3, many sowed.—*Sacc l.c.*

Hab.: Eumundi, on an Araliaceous plant.—*E. Pritzel.*

DIELSEILLA, P. Henn. Hedw. xlii. 84.

Perithecia erumpent-superficial, carbonaceous-black, convex-pulvinate or scutellate, depressed in the middle, papillate, crack subcircular, dehiscent. Asci ovoid or clavate, 4 to 8-spored, paraphyses copious. Spores ellipsoid, 1-septate; dark-brown. This new genus is allied to Lembosia.—*P. Hennings l.c.*

D. Pritzelii, *P. Henn.* Hedw. xlii. 84. Parithecia amphigenous, erumpent, superficial, mostly cæspitose, convex-depressed or scutellate, fragile, coal-black, subiculum fibrillose, hyphæ black, septate, about 4½ μ thick, papillate; crack subcircular, dehiscent, 0·5-1 mm. diam.; asci ovoid or clavate, rounded at the apex, tunicate, 4 to 8-spored, 60-120 x 25-50 μ; paraphyses copious, obvallate, filiform,

septate, guttulate, dusky hyaline, apex clavate, 3-4 μ thick; spores subdistichous or subtristichous, oblong ellipsoid, subfusoid or ovoid, with a central septa, constricted, dark-brown, 36-46 x 15-24 μ.—*P. Hennings l.c.*

Hab.: Upper Barron River, on leaves of Agathis Palmerstoni.—*L. Diels* and *E. Pritzel.*

Tribe XYLARIEÆ.

XYLARIA, Schr.

X. obtusissima, *Berk. Sacc.* Syll. i. 318. form. Capitulum short, broadly elliptic-clavate, very obtuse, stipes very short, outer part thin, fragile, ostiola very minute.—*Sacc. l.c.* (the normal form).

Hab.: Upper Barron River, on dead wood.—*E. Pritzel.*

X. polymorpha, *var.* hypoxylea, *Nits. Sacc.* Syll. i. 310. Stroma sub-globose, at length tumulose-rimose, deformed, on very short stalks, suddenly attenuated; solitary; sporidia 24-30 x 7-9 μ. —*Sacc l.c.*

Hab.: Barron River.—*E. Pritzel.*

X. carpophila, *Pers. Sacc.* Syll. Fungi. 336. Stroma ascending, flexuose, slender, filiform, blackish, simple and tere'e, or the apex slightly spathulately-dilated, even bipartite, more or less villous at the base; conidias-bearing, hymenium grey or olive-grey; conidia very minute, ovate; the perithecigerous clubiike, stipites thickish, mostly very short, subulate, perithecia appearing somewhat tuberculous, apex sterile; perithecia subglobose; asci cylindrical, pedicellate, 8-spored, sporiferous portion 80 x 6; sporidia oblique monostichous, fusiform, obtuse, dark-brown, unequalsided, 12-16 x 4-5.—*Sacc. l c.*

Hab.: Upper Barron River, on the pods of *Castanospermum australe.*—*E. Pritzel.*

RHOPALOPSIS, Cooke.

R. (Kretschmaria) australiensis, *P. Henn.* Hedw. xlii. 83. Stroma placentiform, confluent, depressed, globose, or ovoid, more or less stipitate, rusty or black, about 1 line diameter, ostiola sub-conoid, perithecia subglobose or ovoid; acis clavate, obtuse, sporiferous, 200-300 x 8-10 μ; spores oblong, navicular, both ends obtuse, black, 25-35 x 7-10 μ.—*P. Hennings l.c.*

Hab.: Kuranda.—*E. Pritzel.*

NUMMULARIA, Tul.

N. Bulliardi, *Tul. M. C. Cooke's* Handb. Austr. Fungi 291. Stroma on the destruction of the periderm, emergent, superficial and free, plane, for the most part determinate, orbicular, or oval,. rarely irregular, broadly effused, quite black without and within, punctate with the prominent minute ostiola, at first forming a dirty white fleshy stratum, covered by the epidermis; perithecia rather large, ovate, black, crowded in the stroma; asci cylindrical; 100-120 x 10 μ; sporidia oval, approaching globose, blackish, 12-14 x 9-10 μ.—*Cooke l.c.*

Hab.: Russell River.—*E. Pritzel.*

HYPOXYLON, Bull.

H. rubiginosum, *Pers. Sacc.* Syll. i. 376. Stroma superficial, mostly long and broad, effuse or short, spot-like, bright rusty-red, at length black, somewhat thick, perithecia very dense and irregular, monostichous, stipitate, obovate or subglobose, somewhat large, rounded at top, pierced, more or less prominent, mammilose, conidia bearing hymenium pulveraceous, thin, lutescent at length, bright rust-colour; conidia obovate or oval; asci cylindrical, pedicels very long, 8-spored, paraphyses filiform, very slender, simple stipitate, sporiferous portion 60 x 6; sporidia monostichous, ovate, unequally-sided or straight; blackish, 10 x 5.—From *Sacc. l.c.*

Hab.: On wood, Cairns.—*E. Pritzel.*

H. multiforme, *Fries. Cooke*, in Handb. Austr. Fungi 294. Stroma erumpent, on corticate branches, girt by the ruptured cuticle, or at length free, superficial, hemispherical, thick, subglobose, elliptic, or flattened, or convex, often deformed, on naked wood, more or less effused, superficial, stroma for the most part connate or confluent, at first rubiginous, then black, even; perithecia rather large, globose, papillate, on tuberculose protuberances. Asci cylindrical, 72-100 x 6 μ. Sporidia fusiform, unequal-sided, brown, 10-12 x 4-5 μ.—*Cooke l.c.*

Hab.: Cairns.—*E. Pritzel.*

H. fuscum, *Pers. Cooke*, in Handb. Austr. Fungi 293. Stroma erumpent, then superficial, free, spot-like, depressed by pulvinate, hemispherical, rarely subglobose, purple-brown, then black; perithecia globose, crowded, rather prominent, minutely mamillate. Asci cylindrical, sporidia ovate, obtuse, more or less unequalsided, blackish, 12-16 x 5-7 μ.—*Cooke l.c.*

Hab.: Upper Barron River, on dead wood.—*E. Pritzel.*

H. annulatum, *Schwein. Cooke*, in Handb. Austr. Fungi 294. Hemispherical, confluent, becoming black, internally of the same colour; perithecia subglobose, ostiola in the centre of a dilated disk, with a rather prominent annulate margin; asci cylindrical. Sporidia ovoid, curved, sooty-brown, 9 x 3 μ.—*Cooke l.c.*

Hab.: Upper Barron River.—*E. Pritzel.*

DOTHIDEACEÆ.

Composite, stromatic, pulvinate, &c., coriaceous or carbonaceous, blackish. Perithecial cells homogeneous with the substance of the stroma, and scarcely distinct from it, papiilate or pierced.—*Cooke*, in Handb. Austr. Fungi. 296.

DOTHIDEOIDEI.

PHYLLACHORA, Fell.

P. symploci, *Patouill. Sacc.* Syll. Fung. xi. 371. Stroma epiphyllous, hemispherical, shining-black, 300 μ diam., 1-celled; asci 80-90 x 20; sporidia 15-19 x 8, hyaline.—*Sacc. l.c.*

Hab.: Eumundi, on *Symplocus Thwaitesii.*—*E. Pritzel.*

EUTYPEÆ.

Stroma broadly and indefinitely effused, formed from the more or less changed matrix. Perithecia immersed in the stroma, for the most part densely gregarious.—*M. C. Cookes* Handb. Austr. Fungi 303.

EUTYPA, Tul.

Stoma broadly effused, on bark or wood; ostiola small; asci 8-spored; sporidia allantoid, hyaline.—*Cooke l.c.*

E. flavovirens, *Hoffm. Sacc.* Syll. Fung. i. 172. Stroma at times more or less effuse, superficial, crustaceous, smooth, or tuberculous, scabrous, black, at first yellow inside, soon of a greenish-yellow, at length often of a dark-olive; perithecia frequently monostichous, nestling in the stroma, not stipate, spheroid, minute, neck of ostiola very short, smooth or rugose, obtuse conical, asci cylindrical-clavate, pedicels very long, sporiferous portion 30-50 x 4-7; sporidia distichous, elongate, curved, pale-brown, 6-10 x 2-3; spermogonia, stroma immersed, depressed, conoid, spermatia cylindrical curved, hyaline, sessile adglutinate, finally cirrhose.—*Sacc. l.c.*

Hab.: Eumundi, on Tarrietia trees.—*E. Pritzel.*

E. Tarrietiæ, *P. Henn.* Hedw. xlii 81. Stroma nestling under the epidermis, carbonaceous, black, about 1-3 mm. diam., perithecia 5 to 20, subglobose, ostiole erumpent, subclavate, flexuose, rigid; black at the top and more or less incrassated, obtuse, about 200-400 x 80-100 μ; asci subclavate or fusoid, 8-spored, sporiferous portion 12-15 x $2\frac{1}{2}$-$3\frac{1}{2}$ μ; spores distichous, cylindrical-curvate, obtuse at each end, dusky-hyaline, 4-5 x 0·5-0·8 μ.—*P. Hennings l.c.*

Hab.: Eumundi, on Tarrietia trees.—*E. Pritzel.*

CUCURBITARIÆ

Perithecia cæspitose or gregarious, erumpent, and then sub-superficial.—*M. C. Cooke's* Handb. of Austr. Fungi 304.

CUCURBITARIA, Gray.

Perithecia cæspitose, erumpent, carbonaceous, typically rugulose.—*Cooke l.c.*

C. Pritzeliana, *P. Henn.* Hedw. xlii. 80, with Figures. Perithecia erumpent, superficial, botryose aggregate, membranaceous, subglobose or obovoid, grandulose-verrucose, black, context, pseudo-parenchymatose, dark-brown, about 240-280 μ, hyphæ dusky at base, septate, branching, about $2\frac{1}{2}$-$3\frac{1}{2}$ μ thick; asci clavate, apex rounded, thick tunicate, 100-130 x 20-40 μ, 8-spored; paraphyses obvallate, copious apex, brownish; spores subdistichous or subtristichous, dusky, sometimes both sides hyaline-papillate, pleuriseptate, muriform, first reddish-brown, afterwards dark-chestnut, 25-50 x 9-18 μ.—*P. Hennings l.c.*

Hab.: Russell River.—*E. Pritzel.*

SUPERFICIALES.

Perithecia distinct from each other, superficial or nearly superficial. —*Cooke*, in Handb. Austr. Fungi 304.

CONIOCHÆTA, Sacc.

Perithecia hispid, subsuperficial. Sporidia coloured.—*Cooke l.c.*

C. Queenslandiæ, *P. Henn.* Hebw. xlii. 80. Perithecis superficial, scattered or aggregate, carbonaceous, black, ovoid, top papillate or concave, the dusky mycelium circling, the base branched, densely-bristly, bristle black, 50-200 x 10-15 μ, about 300 μ diam.; asci cylindrical, sporiferous portion about 50 x 4 μ; spores monostichous, oblong ellipsoid, both ends obtuse, dusky-black, 6-8 x 3½-4 μ.—*P. Hennings l.c.*

Hab.: Upper Barron River, on wood.—*E. Pritzel.*

ROSELLINIA, Not.

R. Calami, *P. Henn.* Hedw. xlii. 79. Perithecia superficial, mostly aggregate, confluent, ovoid or subglobose, dark-carbonaceous, at first ferruginous, prinnose, afterwards smooth, black, and somewhat shining, ostiola subconical, 0·3 diam.; asci cylindrical-clavate, apex obtuse, 8-spored, 80-100 μ long, sporiferous portion 70-80 x 4-4½ μ, paraphyses filiform, hyaline, about 1-1½ μ, spores monostichous, oblong ellipsoid, unequalsided, obtuse at each end, 2-guttulate, brown or black, 7-9 x 3½ μ.—*P. Hennings l.c.*

Hab.: Russell River, on Lawyer cane.—*E. Pritzel.*

MICROTHYRIACEÆ.

Perithecia subsuperficial, membranaceous or carbonaceous, dimidiate, flattened, radiating in structure, pierced in the centre, or without a mouth.—*M. C. Cooke*, Handb. Aust. Fungi 312.

MICROTHYRIUM, Not.

Perithecia membranaceous.—*Cooke l.c.* 312.

M. Melaleucæ, *P. Henn.* Hedw. xlii. 78. Perithecia amphigenous, dimidiate-scutellate, black, 0·3-0·7, mm. diam., cellules radiating; asci ovoid, apex tunicate, roundish, attenuated, and curved at the base, 8-spored, 16-20 x 7-8 μ; spores clavate or oblong ovoid. 1-septate, not constricted, greenish-hyaline, 8-10 x 2-2½ μ.—*P. Hennings l.c.*

Hab.: Upper Barron River, on leaves of *Melaleuca leucadendron.*—*E. Pritzel.*

SEYNESIA, Sacc.

Perithecia dimidiate, the margin concrete with the matrix, ostiola central, asci cylindrical (?), sporidia oblong, dusky, constricted, 1-septate, chiefly didymous.—From *Sacc.* Syll. Fung. ii. 668.

S. Banksiæ, *P. Henn.* Hedw. xlii. 78. Spots dusky, rotundate or confluent; perithecis epiphyllous gregarious, scutellate, cellules radiating, black, lobately dehiscent longitudinally, about 180-220 μ diam.; asci ovoid or clavate, apex broad, rotund, 8-spored, 50-80 x 15-22 μ; spores distichous or conglobate, ovoid or subellipsoid, 1-septate, constricted, olive-brown, 13-18 x 7-9 μ.—*P. Hennings l.c.*

Hab.: Eumundi, on Banksia leaves.—*E. Pritzel.*

S. petiolicola, *P. Henn.* Hedw. xlii. 78. Perithecis aggregate, scutellate, dusky cellules radiating, pierced, 200-250 μ diam.; asci oblong ovoid, apex rounded, thick tunicate, 8-spored 30-35 x 10-13 μ.; spores conglobate, ellipsoid or ovoid, rounded at both ends, first hyaline, continuous, granular, afterwards 1-septate at the middle, dusky, 8-10 x 5-6 μ.—*P. Hennings l.c.*

Hab.: Eumundi, on Dysoxylon leaves.—*E. Pritzel.*

PERISPORIACEÆ.

Simple, perithecia membranaceous, coriaceous, or subcarbonaceous, wholly closed, hence without mouth, and irregularly split.—*Cooke*, in Handb. Austr. Fungi 313.

ERYSIPHE, Hedw.

E. communis, *Wallr., Fries.* Amphigenous, mycelium persistent or sometimes evanescent; perithecia variable in size and reticulations; appendages variable in length, often quite long, lying on the mycelium or more or less interwoven with it, usually coloured in part or throughout, but occasionally all hyaline; asci 4-8, or more; spores mostly 4-8, variable in size.—*E. Polygoni, DC.*

The conidial form of this species badly infested Sweet Peas in Brisbane in 1902.

ASTERINA, Lev.

A. (Asterella) Eupomatiæ, *P. Henn.* Hedw. xlii. 78. Spots round or indeterminate, dusky, hypophyllous; perithecis minute lenticular, celiules radiating, black, about 60 μ diam., hyphæ repent, branching, very dark, septate, about 3-3½ μ thick; conidia subellipsoid or oval, black, 2-septate, 10-12 x 5-6 μ; asci subglobose or ovoid, 8-spored, 25-30 x 22-28 μ; spores conglobate, ellipsoid, or ovoid, hyaline, 1-septate, deeply constricted, 12-18 x 5-6 μ.—*P. Hennings l.c.*

Hab.: Eumundi, on leaves of *Eupomatia laurina.—E. Pritzel.*

CORYNELIA, Fries.

Perithecia flask-shaped, coriaceous, black, produced upwards into a neck, which is expanded in a funnel-shaped manner at the apex, collected in tufts which are scattered, seated on an erumpent pulvinate stroma; asci ovate, on long pedicels, 8-spored; sporidia globose, continuous, even, brown.—*M. C. Cooke's* Handb. Austr. Fungi 318.

C. clavata, *Linn. Sacc.* Syll. Fung. ix. 1073. Perithecia flask-form, coriaceous, black, neck elongate, cylindrical, pore pierced, at length dilated, heaps roundish, mostly scattered, rarely subgregarious, 1-3 mm., stroma base pulvinate, erumpent; asci ovate, long pedicellate, 8-spored, 36-44 x 20-26, sporidia conglobate, globose very slightly angular, blackish-brown, smooth, continuous, 10-11 μ diam.; spermatia oblong-fusiform, continuous, hyaline, 6-7 x 2 μ.—*Sacc. l.c.*

Hab.: Upper Barron River, on leaves of *Podocarpus pedunculatus.—E. Pritzel.*

FUNGI IMPERFECTÆ.

SPHÆROPSIDEÆ.

Fungi having a perithecium, but without asci; sporules (stylospores and spermatia of anthers), produced within perithecia, on more or less manifest basidia.—*Cooke*, in Handb. Austra Fungi 345.

SPHÆRIOIDEÆ.

Perithecia membranaceous, carbonaceous, or subcoriaceous, black (never fleshy, bright-coloured), globose, conical, or lens-shaped, entire, immersed or superficial.—*Cooke l.c.*

PHYLLOSTICTA, Pers.

P. Leucadendri, *P. Henn.* Hedw. xlii. 86. Spots rotundate, dusky or pale; perithecia epiphyllous scattered, minute, punctiform, black, pierced at the apex, about 60 μ in diam.; conidia, oblong ellipsoid or oval, hyaline, 2-guttulate; 3-3½ x 0·8 μ.—*P. Hennings l.c.*

Hab.: Upper Barron River, on leaves of *Melaleuca leucadendron.—E. Pritzel.*

PHOMA, Fries.

P. Disoxyli, *P. Henn.* Hedw. xlii. 86. Perithecia on leaf, stalks scattered or gregarious, innate-erumpent, hemispherical, dark-membranous, pierced at the apex, about 130-150 μ diam.; conidia oblong ellipsoid or oval, obtuse rotundate at both ends, hyaline, guttulate, 5-6 x 2½-3½ μ.—*P. Hennings l.c.*

Hab.: Eumundi, on a Dysoxylon.—*E. Pritzel.*

APOSPHÆRIA, Berk.

Perithecia rather carbonaceous, superficial, or with the base buried in the matrix; sporules continuous, hyaline.—*Cooke*, in Handb. Austr. Fungi 349.

A. Melaleucæ, *P. Henn.* Hedw. xlii. 86. Spots none, perithecia amphigenous, scattered, superficial, black, pores perforated, hyphæ dusky at the base, about 30-40 μ diam.; conidia subfuscoid, hyaline continuous, 2½-3½ x 0·5 μ.—*P. Hennings l.c.*

Hab.: Upper Barron River, on leaves of *Melaleuca leucadendron.—E. Pritzel.*

CONIOTHYRIUM, Corda.

Perithecia subcuticular, erumpent or almost superficial, globose or depressed, papillate, black, sporules globose or ellipsoid, small, continuous, sooty-brown.—*Cooke*, in Handb. Austr. Fungi 352.

C. xanthorœæ, *P. Henn.* Hedw. xlii. 86. Spots pale on the end of the leaf; perithecia innate-erumpent, subhemispherical, black, perforated, about 80 μ; conidia ovoid or ellipsoid, dusky, about 3-3½ x 2 μ.—*P. Hennings l.c.*

Hab.: Eumundi, on Grass-tree.—*E. Pritzel.*

DIPLODIA, Fries.

D. calamicola, *P. Henn.* Hedw. xlii. 87. Perithecia innate-erumpent, scattered, minute, subcarbonaceous, black; conidia ovoid or ellipsoid, each end obtuse, at first hyaline, guttulate, afterwards septate in the middle, dusky, 15-18 x 7-9 μ, conidiophore short, hyaline about 2-3 μ thick.—*P. Hennings l.c.*

Hab.: Eumundi, on stems of *Calamus Muelleri.*—*E. Pritzel.*

SEPTORIA, Fries.

S. calami, *P. Henn.* Hedw. xlii. 86. Spots pale, indeterminate, perithecia innate-suberumpent, hemispherical, black pores perforated, 50-60 μ diam.; conidia filiform, flexuose, hyaline, often 5-septate, 25-40 x 0·4-0·5 μ.—*P. Hennings l.c.*

Hab.: Cairns, on leaves of *Calamus caryotoides.*—*E. Pritzel.*

DICHOMERA, Cooke.

Perithecia and stroma dothideaceous, pulvinate, erumpent sub-immersed, globular, papillulate, sporules globular or ellipsoid, 2-4-septate—walls are often radiate or cruciate, 3-6-septate, sooty, stipitellate.—From Syll. Fung. iii. 471.

D. Persooniæ, *P. Henn.* Hedw. xlii. 87. Spots dusky, rotundate, perithecis subcutaneous erumpent, gregarious, subhemispherical, black, ostiolate, 100-180 μ; conidia subglobose, ovoid or elliptic, 1-4-septate, muriform, dusky or black, 5-8 x 4-6 μ.—*P. Hennings l.c.*

Hab.: Upper Barron River, on leaves of *Persoonia salicina.*—*E. Pritzel.*

NECTRIOIDEÆ.

Perithecia and stroma (when present) rather fleshy or waxy, brightly coloured (white, yellow, red, or orange), globose, or rarely elongated, or somewhat cup-shaped, sporules various, mostly hyaline. —*Cooke*, in Handb. Austr. Fungi 357.

ASCHERSONIA, Mont.

A. australiensis, *P. Henn.* Hedw. xlii. 87. Stroma amphigenous, dimediate-scutellate, or rotundate-convex, orange-coloured, at length reddish-brown, pluripunctulate, 1-1½ mm. diam., margins broad membranaceous, circumference pale, perithecia immersed, oblong, conidia fusoid, acute at both ends, hyaline, 5-7 x 1 μ, hyphæ filiform, hyaline, 20-40 x 1 μ intermixed.—*P Hennings l.c.*

Hab.: Upper Barron River, on leaves of *Callistemon lanceolatus.*—*E. Pritzel.*

ASTEROSTOMELLA, Speg.

Perithecia dimidiate-scutate, within a smoky substratum, dehising radiately; sporules continuous, ovoid, smoky.—*Sacc.* Syll. Fung. x. 423.

A. paraguensis, *Speg.* Guar. i. p. 151. Spots none, substratum amphigenous, loose radiant, obliquely orbicular, 2-3 mm. diam.; brown, often confluent; hyphæ creeping, densely septate, branches intricate, 2·5-3·5 μ thick; perithecia orbicular, 50-90 μ diam., black, smooth, context radiating-parenchymatically, pallucid, olive, margins more or less fringed; sporules ovoid, often 1-guttate, 14-20 x 8-14, sooty; basidia short, hyaline, soon diffluent.—*Sacc.* Syll. Fung. x. 424 (the species).

A. P. forma. *P. Henn.* Hedw. xlii. 87. The conidia somewhat smaller, 12-16 x 6-10, otherwise the plant agrees with the species.—*P. Henn.*

Hab: Kuranda, on leaves of *Santalum lanceolatum.*—*E. Pritzel.*

CORYNEUM, Nees.

Pustules discoid or pulvinate, subcutaneous, erumpent, black, compact, conidia oblong or fusoid, 2 or many septate, coloured.—*Cooke,* in Handb. Austr. Fungi 364.

C. papilliferum, *P. Henn.* Hedw. xlii. 87. Heaps erumpent, subdiscoid, black, about 80-100 μ; conidia subfuscoid, 4-septate, not constricted, 8-10 x 4½-5½, 3 middle cells dark, upper one papillate, hyaline about 3 μ diam., lower one hyaline, stipes 15-20 x 2 μ, hyaline.—*P. Hennings l.c.*

Hab.: Russell River, on dead wood.—*E. Pritzel.*

CONIOSPORIUM, Link.

Conidia globose, or ovoid, or discoid, arising from very short hyaline threads, for the most part effused and smearing.—*Cooke,* in Handb. Austr. Fungi 373.

C. atrœffusum, *P. Henn.* Hedw. xlii. 87. Heaps broad effuse, very black, pulverulent; conidia subglobose black, 8-12 μ diam; stalks short, subhyaline dusky.—*P. Hennings l.c.*

Hab.: Upper Barron River.—*E. Pritzel.*

CERCOSPORA, Fries.

Hyphæ rather soft, simple or branched, brown, often growing on spots upon leaves. Conidia vermicular, brown, olive, rarely almost hyaline.—*Cooke*, in Handb. Austr. Fungi 378.

C. calamicola, *P. Henn.* Hedw. xlii. 88. Spots black, subrotund; hyphæ fasciculate or scattered, septate, 4-5 μ thick, conidia clavate, apex obtuse, dusky, 5 to 7-septate not constricted, 40-80 x 4-8 μ.—*P. Hennings l. c.*

Hab.: Cairns, on leaves of *Calamus caryotoides.*—*E. Pritzel.*

STILBEÆ.

Byssoid fungi, pale or brown. Sterile hyphæ creeping, sparse; fertile collected in fascicles (stroma), bearing conidia at the apex.—*Cooke*, in Handb. Austr. Fungi 381.

HYALOSTILBEÆ.

Hyphæ and conidia pallid.—*Cooke l.c.*

PRITZELIELLA. P. Henn. Hedw. xlii.

Stroma stipitate-capitulate or subclavate, simple, not at all branched, hyphæ coalescing, hyaline conflated. Conidia catenulate, subglobose, hyaline. Related to *Coremium*, but the apex not branched.—*P. Hennings l.c.*

P. cærulea, *P. Henn.* Hedw. xlii. 88. Stroma gregarious, erect stipitate, 2-3 mm. long, stipes subterete, pale, with the hyphæ hyaline, about 2-3 μ thick, about $1\frac{1}{2}$-$2\frac{1}{2}$ mm. long, 120-130 μ thick; capitulum subglobose or oblong compressed, about 200-230 μ diam., blue conidia catenulate, subglobose or ellipsoid, hyaline, 2-$2\frac{1}{2}$ x $1\frac{1}{2}$-2 μ.—*P. Hennings l.c.*

Hab.: Upper Barron River, on the pupa or chrysalis of a butterfly.—*E. Pritzel.*

PILACRE, Fries.

Stroma stipitate, capitate; capitulum subglobose or depressed, composed below of branched; flexuous, radiating threads, membranaceous above, fragile, and falling away. Coridia simple, globular, collected in a peripherical compact stratum.—*Cooke*, in Handb. Austr. Fungi 382.

P. Petersii, *B. and C. Ann. N.H. Sacc.* Syll. Fung. iv. 580. Stipes short, white, 4 mm. high, capitulum rather large, 2-4 mm. diam.; hyphæ nearly straight, anastomosing, branches tortuose, conidia, globose, 5 μ diam., tawny. P Hennings says of the Queensland specimen "Hyphæ hyaline, spores almost globose, reddish-brown, 5-6 μ."

Hab.: Upper Barron River.—*E. Pritzel.*

PODOSPORIUM, Schw.

Hyphæ rigid, black, coalescing in a simple or branched stem; conidia laterally scattered on both sides (not capitate), oblong or elongated, 2 or many septate, sooty-brown.—*Cooke*, in Handb. Austr. Fungi 385.

P. australiense, *P. Henn.* Hedw. xlii. 88. Stroma scattered or cæspitose, simple, rigid, filiform, black, 3-4 mm. long, usually thickened at the base to 100 μ; conidia everywhere latterly scattered, cylindrical-clavate, curved, apex obtuse, dusky, 3-5-septate, 40-100 x 4-5 μ.—*P. Hennings l.c.*

Hab : Upper Barron River.—*E. Pritzel.*

ANTROMYCOPSIS, Pat. et Trab. Bull. Soc., *Mycol de France.*

On wood. Stroma stipitate-capitate, firm, brownish; capitulum hemispherical compact, from simple or forked filaments, septate; conidia brown, simple, ovoid or oblong.—*Sacc.* Syll. Fung. xiv. 1113.

A. ? squamosus, *P. Henn.* Hedw. xlii. 88. Stroma cæspitose 4-6 mm. high, stipites terete, solid, firm, white inside, ferrugenous outside squamulose or tomentose, 3-5 x 0·6 μ; capitulum hemispherical or globose, 0·6-0·8 mm. diam., dark-grey, conidia acrogenous ovoid, dusky-transparent, 5-6 x 3½-4 μ.—*P. Hennings l.c.*

Hab.: Kuranda, on dead wood.—*E. Pritzel.*

By Authority: George Arthur Vaughan, Government Printer, William street, Brisbane.

B694

Queensland

Department of Agriculture and Stock, Brisbane

Botany Bulletin No. XVII

Contributions to the : Queensland Flora :

By F. MANSON BAILEY, C.M.G., F.L.S.
Colonial Botanist

By Authority :
ANTHONY JAMES CUMMING, Government Printer, Brisbane
1913

JD

PREFATORY NOTICE.

It is probably in the memory of many Queensland fern-lovers that about two years ago a Continental botanist, **Dr. K.** Domin, was travelling in Queensland collecting specimens of our flora, and has lately forwarded me a copy of his published results as far as refer to the ferns and their allies ;* and the number of kinds new to our flora he records is remarkably large and most interesting, considering the comparatively short time spent by him in the State. He uses a different system to that used by Bentham in the "Flora Australiensis." Thus in recording these additions to our flora they are given in accordance with the above work, my "Queensland Flora," and the more recently published "Comprehensive Catalogue of Queensland Plants." This will doubtless be of advantage to Queensland lovers of this beautiful class of vegetation. All true lovers of plant life will acknowledge that the constant changing backwards and forwards of classification and nomenclature retards in a great measure persons taking up the study of plants as a hobby.

It will be observed that several of Dr. Domin's new kinds have not been considered to have distinctive difference enough to carry a name ; therefore at times the plant has not received notice ; and among some of those left to stand when the specimens have been examined it may be found that some are but growths of well-known kinds, for our ferns vary so

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* K. Domin : Beiträge zur Flora und Pflanzen-geographie Australiens 1. Abt. Pteridophyta (Prodromus einer Farnflora Queenslands) : Stuttgart 1913.

greatly in distant habitats that even the old practised hand is often led astray, and to the European botanist this must be particularly confusing. Where forms of very distinctive growth have been met with, such may be and very likely are only very rare sports of old known plants; that such is the case we have only to think of the many wonderful forms which have been brought to our knowledge from various localities, and some of which are now not uncommon in garden culture.

Finally, I think that had Prof. Domin had a longer experience with our ferns, and observed the great diversity of their form and growth, he would have realised that some of his new kinds were but growths of well-known species; and it will be observed that attention has been drawn to some of these where it was thought necessary.

F.M.B.

October, 1913.

BOTANY:

Contributions to the Queensland Flora.

Order LYCOPODIACEÆ.

Of these plants Dr. Domin mentions some species which are new to Queensland, and a few varieties which had not previously been described.

LYCOPODIUM, Linn.

L. phlegmaria, *Linn.*, var. **longibracteatum,** *Domin*, Prodr. p. 228. This is hardly worthy of varietal rank, and is included in the description of the species in Benth. Fl. Austr. vii. p. 674.

L. serratum, *Thunb.*, Fl. Jap. 341, t. 38; *Domin*, Prodr. p. 226. Stems slender, subercct, ½-1 ft. long, once or twice dichotomously forked. Leaves laxly disposed, lanceolate, ¼-1 in. long, 1-2 lines broad, acute, much narrowed to the base, thin in texture, bright green, crisped and serrated on the margin, often very irregular in size on the same branch; midrib very distinct. Sporangia in the axils of unaltered leaves all down the stem.—*Bak.*, Handbk. Fern-Allies p. 12.

Hab.: Bellenden-Ker, *K. Domin*. A widely spread species found in Asia, Malaysia, Polynesia, Mexico, and Bourbon.

L. carinatum, *Desv.*, Ency. Bot. Suppl. iii. 559; *Domin*, Prodr. p. 227. Stems pendulous, 1-2 ft. or more long, several times dichotomously forked, ¼ in. diam. including the leaves. Leaves moderately close, ascending, lanceolate, acute, thick, green, rigid, entire, ¼-⅓ in. long; midrib distinct. Sporangia in long usually simple square spikes in the axils of ovate acute rigid green sharply keeled bracts 1-12th to 1-8th in. long.—*Bak.*, Handbk. Fern-Allies p. 17.

Hab.: Cooktown, Finchbay, *O. Warburg*. Also found in the Neilgherries, Malaysia, Philippines, Formosa, and Polynesia.

L. volubile, *Forst.*, Prodr. 86 ; *Domin*, Prodr. p. 230. Stems wide-scandent, wiry, stramineous ; branchlets decompound ; ultimate branchlets divaricate ; sometimes 2-3 in. long, 2-3 in. broad, including the distichous leaves. Leaves very dimorphic, firm but thin in texture, pale green ; those of the lower plane lanceolate, 1½-2 lines long, with a broad adnate base, a distinct excurrent midrib, and an oblique ascending point ; those of the upper plane linear, adpressed to the stem. Spikes very abundant, cylindrical, pendulous, 1-3 in. long, 1-12 in. diam., forming ample panicles apart from the leaves ; bracts ascending, imbricated, broad ovate, with a small cusp.—***Bak.*,** Handbk. Fern-Allies p. 29 ; *Benth.*, Fl. Austr. vii. 677.

Hab. : Bellenden-Ker, *K. Domin.* Found in New Zealand, New Caledonia, Polynesia, and Malaysia.

PSILOTUM, Sw.

P. triquetrum, *Sw.*, var. **fallacinum,** *Domin.*, Fedde Repert. ix. (1911) 551. Branches numerous, very long, not much branched, pendulous ; broader than in the type but triquetrous.—*P. nudum*, Griseb., var. *fallacinum*, Domin Prodr. p. 232.

Hab. : Yarraba, and coast near the mouth of the Russell River, *K. Domin.*

The distinctions above given seem only those of growth and situation.

SELAGINELLA, Spring.

S. australiensis, *Bak.*, var. **sciuroides,** *Domin.*, Prodr. p. 236. Stems long-creeping, forming loose or rather dense tufts ; fruiting spike elongate, up to over 2 in. long, numerous, slender and soft, often subflexuose. Branches more robust and leaves larger.

Hab. : Picnic Creek, Russell River, *K. Domin.*

This seems to be only a growth of *S. Bakeriana*, Bail.

S. flabellata, *F. v. M.*, var. **brevispica,** *Domin*, Prodr. p. 237 (under *S. longipinna*, Warb.). Spikes scarcely 2½ lines (5 mm.) long.

Hab. : Bellenden-Ker, *K. Domin.*

Scarcely worthy of a distinctive name.

Order FILICES.

MARATTIA, Sm.

M. oreades, *Domin*, Prodr. p. 219. From the description this can hardly be separated from that very variable species *M. fraxinea*, Sm.

TRICHOMANES, Linn.

T. paradoxum, *Domin*, Prodr. p. 10. Rhizome elongate, slender, creeping over the trunks of trees. Fronds somewhat rigid, minute, crowded, sessile or nearly so, about $1\frac{3}{4}$ line long or rather more, ovate-orbicular, base subcordate, undivided but with a sinuate margin ; glabrous ; margins with stipitate, stellate, almost black setæ. Veins repeatedly forked ; the lower part of the costæ slightly prominent. Sori always solitary, terminal, apex free, prominently bilabiate ; receptacle long-exserted.

Hab. : Bellenden-Ker, *K. Domin.*

T. serratulum, *Baker* ; *Domin*, Prodr. p. 15. Rhizome slender, wide-creeping ; stipes slender, naked, about $\frac{1}{4}$ in. long ; frond under $\frac{1}{2}$ in. long, about $\frac{1}{2}$ in. broad, oblong or subrhomboidal in general outline, pinnatifid down to a narrowly winged rhachis ; segments erecto-patent, in 2-6 pairs, linear, simple or forked, $\frac{1}{4}$ in. long, under $\frac{1}{2}$ line broad, toothed at the margin, texture membranaceous ; a central costa only in each segment ; spurious venules none ; sori 1 to 2, terminal on the upper segment, the tube exserted or even stipitate, the mouth slightly two-lipped, deeply ciliated with sharp linear teeth.—*Hook.-Bak.*, Syn. Fil. 80.

Hab. : Bellenden-Ker, *K. Domin.* Also found in Borneo.

T. cupressoides, *Desv.* ; *Domin*, Prodr. p. 18. Rhizome short-creeping, scaly throughout or at the extremity only. Stipes approximate, 2-8 in. long, slightly covered with brownish hairs. Fronds 2-8 in. long, 1-6 in. broad, deltoid, obovate or lanceolate, acuminate, 3-4 pinnatifid, the main rhachis mostly slightly winged towards the apex and submarginate below. Pinnæ erecto-patent, about $\frac{3}{4}$ in. broad, lanceolate-oblong, cut down nearly or quite to the rhachis. Pinnulæ deeply pinnatifid, with linear simple or pinnatifid lobes. Ultimate segments short and often tooth-like. Texture coriaceous ;

margin often slightly crisped. Sori 2-12 to a pinnula, small; indusium more or less exserted, the mouth slightly dilated.—V. Alder. v. Rosenb., Malayan Ferns 103.

Hab.: Bellenden-Ker, *K. Domin.* A widely distributed species, found in Madagascar, the Mascarene Islands, Comores, Seychelles, and Tropical Asia.

HYMENOPHYLLUM, Sm.

H. Shirleyanum, *Domin,* Prodr. p. 22. From the distinctions of this species given by the author, the present plant can only be considered as a form of *H. javanicum,* Spreng.

H. gracilescens, *Domin,* Prodr. p. 23. Rhizome filiform, creeping. Frond on a slender stipes of about $\frac{2}{3}$ in., oblong-elliptical, about $1\frac{3}{4}$-2 in. long or rarely more and about 1 in. or more broad, pinnate; rhachis slender, glabrous; pinnæ loose, distant; the lowest 2-3 furcate, short; the middle ones the longest, pinnate-furcate; the upper ones bifurcate; the uppermost simple; segments narrow linear, serratulate-dentate. Sori terminal, indusium divided to the base, valves smooth about $\frac{1}{2}$ line long, ovate, denticulate in the upper portion.

Hab.: Bellenden-Ker, *K. Domin.*

H. ciliatum, *Swartz*; *Domin,* Prodr. p. 23. Stipes 1-2 in. long, ciliated and decurrently winged above; frond oblong-acuminate, tripinnatifid, 2-6 in. long, 1-2 in. broad at the centre; main rhachis broadly winged throughout and ciliated; lower pinnæ oblong or rhomboidal, with a broad central undivided portion, and numerous erecto-patent simple or forked ciliated linear segments 2-3 lines long; sori 2-12 on a pinna, placed at the end of the lateral segments on both sides; involucre immersed, suborbicular; valves divided about halfway down, and conspicuously ciliated.—*Hook-Bak.,* Syn. Fil. p. 63.

Hab.: Southern Queensland (without specific locality), *C. Warburg.*
A widely spread tropical species.

DAVALLIA, Sm.

D. epiphylla, *Blume* (non Forster); *Domin,* Prodr. p. 72. Rhizome thick, fibrillose; stipes 4-6 in. long, erect, firm; frond 12-15 in. long, 6-9 in. broad, deltoid-lanceolate, tripinnatifid; main rhachis hardly at all winged; pinnules of the lowest pinnæ lanceolate, $1\frac{1}{2}$ in. long, $\frac{1}{2}$ in. broad; segments narrow,

mucronate, sharply toothed ; texture coriaceous ; veins not immersed, one or two carried into each tooth ; sori small, submarginal, half-cupshaped, with the sharp mucro of the tooth extending beyond them.—*Hook.-Bak.*, Syn. Fil. 96.

Hab. : Cairns, *O. Warburg*. Also found in the Malayan Archipelago.

LINDSÆA, Dry.

L. ensifolia, *Sw.*, var. **intercedens,** *Domin*, Prodr. p. 80 (under Schizoloma). This appears only a growth of *Lindsæa ensifolia*, Sw., var. *heterophylla*, Benth.

L. trichomanoides, *Dryand.* Rhizome creeping. Fronds rather rigid, 6 in. to nearly 1 ft. high, including the long wiry stipes, bipinnate. Primary pinnæ almost opposite, usually $\frac{1}{2}$-1 in. long ; pinnules obovate or oblong-cuneate, æquilateral, 2-3 lines long, the upper ones confluent, all rounded and entire at the end with a continuous sorus, or notched with an interrupted sorus and indusium. Veinlets forked, not anastomosing.—*Benth.*, Fl. Austr. vii. p. 720. *L. cuneata*, C. Christens., Ind. Fil. 392 ; Domin, Prodr. p. 83.

Hab. : Cairns, *O. Warburg*.

L. lobata, *Poir.*, var. **contigua,** *Domin*, Prodr. p. 84 (under *L. decomposita*, Willd.). Fronds mostly twice pinnate with a stipes up to 9 in. long but intermixed with several shortly stipitate ones with simply pinnate stipes about 6 in. long. Terminal pinna about $3\frac{1}{2}$ in. long, lateral pinnæ 3-5 about 2-4 in. long, pinnules about $3\frac{1}{2}$-4 lines long, the upper margin for the greater part entire and with the linear indusium continuous along the margin, more rarely (chiefly in the weaker simply pinnate fronds) crenulate-incised and then the indusium twice or thrice interrupted, veins conspicuous, anastomosing, texture somewhat coriaceous.

Hab. : Harvey's Creek, *K. Domin*.

L. davallioides, *Blume.* Rhizome short-creeping ; stipes 6-12 in. long, firm, erect ; frond with a long central point and 2 or 3 pairs of erecto-patent curved branches, 4-8 in. long ; pinnæ 4-6 lines long, 2-3 lines broad, the lower margin straight or slightly curved, the upper with 4 to 6 regular rounded but not deep lobes, placed close together but not imbricated ; texture pellucido-herbaceous ; veins anastomosing at the

base of the lobes; sori interrupted-linear, confined to the apices of the lobes.—*Hook.-Bak.*, Syn. Fil. 111. *L. decomposita*, Willd., var. *davallioides*, Domin, Prodr. p. 84.

Hab.: Harvey's Creek, *K. Domin.*

L. repens, *Bedd.*, Handb. Ind. Ferns, 74; Ferns, S. India, tab. ccix.; *Domin*, Prodr. p. 85. Rhizome wide-creeping, climbing, scaly. Fronds simply pinnate, 8-17 in. long, $1\frac{1}{2}$-$1\frac{3}{4}$ in. broad. Leaflets $\frac{1}{2}$-1 in. long, about half as broad, the lower line often slightly upcurved, the point acute or rounded, the upper edge straight or more or less rounded, subentire or crenato-lobate. Texture pellucido-herbaceous. Sori sub-marginal, large, about as broad as long, one to each crenation, often confluent in the subentire forms when the apices of the veins are joining.—V. Alder. v. Rosenb., Malayan Ferns 261.

Hab.: Harvey's Creek, *K. Domin.*

ADIANTUM, Linn.

A. formosum, *R. Br.*, var. **leptophyllum,** *Domin* in Fedde Repert. ix. (1911) 551; Prodr. 148. Pinnæ and pinnules more rigid, crowded, pinnules smaller, the largest about 2 lines long, oblique.

Scarcely worthy of varietal rank.

A. hispidulum, *Sw.*, var. **glabratum,** *Domin*, Prodr. p. 151. Pinnules shining and glabrous on both sides or (especially on the lower side) with very few bristles, small, about $2\frac{1}{2}$-3 lines long, but a few attaining nearly $\frac{1}{2}$ in.

Hab.: Picnic Hill, Russell River, *K. Domin.*

The above is probably identical with *A. hispidulum*, Sw., var. *Fitzalani*, Bail.

A. hispidulum, *Sw.*, var. **hypoglaucum,** *Domin*, Prodr. p. 152. Pinnules usually glaucous beneath.

Hab.: Tambourine Mountain, *K. Domin.*

I cannot separate *A. tenue*, Domin, Prodr. p. 152, and its three varieties, from *A. hispidulum*, Sw.

CHEILANTHES, Sw.

C. queenslandica, *Domin*, Prodr. p. 140 (as a subspecies).

C. Shirleyana, *Domin*, Prodr. p. 145 (as a subspecies).

I cannot see how Dr. Domin's two subspecies, *C. Shirleyana* and *C. queenslandica*, can be distinguished from *C. tenuifolia*, Sw., which differs so very much from various localities.

C. caudata, *R. Br.*, var. **diversiloba,** *Domin*, Prodr. p. 144. Tall; frond 4-8 in. long, deltoid-lanceolate, with a much shorter stipes, much divided; terminal segments of the pinnæ and pinnulæ shorter, scarcely 5 lines long; pinnulæ of the lowest pinnæ pinnate at the base, pinnatilobed at the middle, with 3-5 ovate-oblong or short, broad, rotundate lobes.

Hab.: Picnic Hill, Russell River, *K. Domin*.

PTERIS, Linn.

P. paradoxa, *Bak.*, var. **trichophora,** *Domin*, Prodr. p. 130 (under Pellæa).

P. tremula, *R. Br.*, var. **pectinata,** *Domin*, Prodr. p. 156.

The distinctions given of these two plants seem hardly sufficient to distinguish them as varieties.

P. aquilina, *Linn.*, var. **yarrabensis,** *Domin*, Prodr. p. 161 (under Pteridium). Indumentum agreeing with the var. *lanuginosa*, Hook. Fronds broadly triangular, tripinnate. Lowest pinnæ broadly triangular, æquilateral. Medium pinnæ simply pinnate. Margins of the pinnules not particularly thickened (not crenulate).

Hab.: Yarraba, *K. Domin*.

The above, on account of its indumentum, might better be kept as a form of *P. aquilina*, Linn., var. *lanuginosa*, Hook.

MONOGRAMME, Schkuhr.

M. dareicarpa, *Hook.* Rhizome slender, wide-creeping; scales linear. Frond $\frac{3}{4}$-1 in. long, $\frac{1}{2}$ line broad upwards, narrowed gradually downwards into a short slender stem. Texture subcoriaceous. Sori sunk in a deep cleft on one side of the midrib, the wing which covers it reaching nearly to the edge.—*Hook.-Bak.*, Syn. Fil. 375; *Domin*, Prodr. p. 162.

Hab.: Bellenden-Ker, *K. Domin*. Extends to New Guinea, Borneo, and the Philippine Islands.

DOODIA, R. Br.

D. aspera, *R. Br.*, var. **angustifrons,** *Domin*, Prodr. p. 121. Apparently only a growth of the normal form.

D. caudata, *R. Br.*, var. **dimorpha,** *Domin*, Prodr. p. 124. Seems from the description and figure only a growth of *D. caudata*, R. Br., var. *media*, Benth.

ASPLENIUM, Linn.

A. falcatum, *Lam.*, var. **fibrillosum,** *Domin*, Prodr. p. 96 (under *A. adiantoides*, Christens.).

A. falcatum, *Lam.*, var. **macrurum,** *Domin*, Prodr. p. 96 (under *A. adiantoides*, Christens.).

The above two varieties are merely growths of the common form.

A. cuneatum, *Lam.*, var. **orarium,** *Domin*, Prodr. p. 103. Plant of a small and slender growth. Stipes glabrous, fuscous, about $3\frac{1}{2}$-4 in. long. Largest fronds scarcely 8 in. long, but several soriferous ones much smaller about 4 in. long, lanceolate, bipinnate or subtripinnate at the base, lowest pinnæ about 2 in. long, lanceolate-triangular ; lowest pinnules subpinnate ; pinnules and ultimate segments obovate-cuneate. Sori narrow-oblong, often solitary or binous on the segments. Texture sub-coriaceous.

Hab. : Cape Grafton, *K. Domin.*

A. normale, *Don.* ; *Domin*, Prodr. p. 94. Stipes 4-6 in. long, tufted, wiry, blackish, polished ; frond 8-12 in. long, $1\frac{1}{2}$ in. broad, with very numerous close-placed pinnæ, the lower ones, which are $\frac{3}{4}$ in. long, $\frac{1}{4}$ in. broad, deflexed, the point obtuse, the edge inciso-crenate, the upper side auricled and narrowed suddenly at the base, the lower truncate in a straight line ; texture subcoriaceous ; rhachis glossy, nearly black ; veins mostly once forked ; sori in two unequal parallel rows.—*Hook.-Bak.*, Syn. Fil. 197 ; *Maid. and Betche*, Proc. Linn. Soc. N.S.W. **xxxv.** (1910) p. 801.

Hab. : Evelyn Scrub, Herberton District, *R. F. Waller.*

A. resectum, *Sm.*, var. **amœnum,** *Presl.* (as a species). A tufted glabrous fern with simply pinnate fronds mostly below 1 ft. high including the slender stipes, and 2-4½ in. broad at the base, gradually narrowed towards the top, mostly bulbiferous near the apex. Pinnæ lanceolate, unequal-sided, the upper side broadly cuneate at the base, the lower side narrowly cuneate and sometimes slightly cut away, bluntly toothed or lobed on both sides, the incisions shallow towards the point of the pinnæ, deeper near the base and cut down on the upper side, nearly or quite to the rhachis in the lowest one or two pairs of pinnæ leaving thus a single pinnule on the base of the lowest pinnæ of the larger fronds. Texture thinly coriaceous. Veins very oblique, forked. Sori in an irregular line on each side of the midrib, the indusium opening towards the midrib.—*A. amœnum*, Presl., Maid. et Betche, Proc. Linn. Soc. N.S.W. xxxv. (1910) p. 800; *A. unilaterale*, Lam., var. *amœnum*. Domin, Prodr. p. 95.

Hab.: Evelyn Scrub, Herberton District, *R, F. Waller.*

ASPIDIUM, Sw.

A. confluens, *Mett.*, f. **simplicius,** *Domin*, Prodr. p. 54.

A. confluens, *Mett.*, f. **decompositum,** *Domin*, Prodr. p. 54.

I cannot separate the above two ferns even as forms.

A. Dietrichianum, *Luerss.*, Journ. Mus. Godeffr. iii. 16. *Diplazium Dietrichianum*, C. Christens., Ind. Fil. 231; Domin Prodr. p. 89. Allied to *A. esculentum*, Presl. (*Diplazium esculentum*, Sw.), Domin l.c.

Hab.: Port Denison, Bowen, *Amalie Dietrich.*

Unfortunately I cannot give a description of this species, having no specimens, and the description is published in a work to which I have not access.

A. capense, *Willd.*; *Benth.*, Fl. Austr. vii. p. 758. Rhizome creeping. Fronds from under 1 ft. to 2 ft. high, usually broad, rigid, the stipes and rhachis more or less scaly, mostly twice pinnate but the smaller ones occasionally simply pinnate. Pinnæ coriaceous, lanceolate, toothed or pinnatifid with reticulate veins concealed in the thick tissue. Sori often large, one

to each tooth or lobe. Indusium peltate and rigid, but fallen away from old sori.—*Polystichum adiantiforme*, J. Sm., Domin, Prodr. p. 57.

Hab. : Tambourine Mountain, *K. Domin*.

A. cordifolium, *Sw.*, var. **tambourinense**, *Domin*, Prodr. p. 66 (under Nephrolepis).

The distinguishing marks given do not seem sufficient to remove this plant from the common form.

A. exaltatum, *Sw.*, var. **hirsutulum,** *Baker* (under Nephrolepis). Closely allied to the var. *longipinnæ*, but easily distinguished by the rhachis densely and both surfaces (especially the upper) more or less coated with ferruginous down.—*Nephrolepis hirsutula*, Presl., Domin Prodr. p. 68.

Hab. : Harvey's Creek, *K. Domin* ; Mackay, *Amal. Dietrich*.

A. volubile, *Sm.* (under Nephrolepis). Rhizome climbing high over trees, with adpressed chestnut scales on the short lateral distant spurs, whence spring clusters of stipes ; pinnæ obtuse or not very acute ; venation and sori much as in *A. exaltatum*.—*C. B. Clarke* in Trans. Linn. Soc. Bot. 2nd ser. i. p. 541, tab. lxxviii.

A tropical Asiatic species in North Queensland represented only by the following variety :—

Var. **cavernicolum,** *Domin*, Prodr. p. 66 (under *Nephrolepis radicans*, Kuhn). Differs principally in its membranous texture and the lower pinnæ sometimes obscurely subcordate.

Hab. : Chillagoe Caves, *K. Domin*.

A. submarginale, *Domin*, Prodr. p. 62 (under Arthropteris). Cannot separate this species from *A. ramosum*, Beauv.

A. prorepens, *Domin*, Prodr. p. 64 (under Arthropteris). The sori being unknown of this species, nothing can be said about its position until more is known of it.

A. decorum, *Domin*, Prodr. p. 48. I fail to separate this species from *A. pteroides*, Sw.

A. attenuatum, *Sw.* Rhizome stout, wide-creeping. Stipes 1 ft. or more long, stout, brownish, villose. Frond 1½-2 ft. long, 8-12 in. broad. Pinnæ numerous, 4-5 in. long, ½ in. broad, cut about one-third down into sharp, triangular, falcate lobes, lower pinnæ distant and dwarfed, texture subcoriaceous; rhachis and under surface villose; veins pinnate in the lobes, with 6-8 veinlets on a side. Sori in lobes close to the midrib.—*Dryopteris dissecta,* O. Ktze., Domin Prodr. p. 39; *Nephrodium dissectum,* Desv., Hook.-Bak. Syn. Fil. 290 (1868) and 282 (1874).

Hab.: Mackay, *Amalie Dietrich*; Cairns, *O. Warburg.* Also found in the Polynesian Islands.

A. decompositum, *Spreng.*, var. **latilobum,** *Domin,* Prodr. p. 37 (under Dryopteris).

A. decompositum, *Spreng.*, var. **angustilobum,** *Domin,* Prodr. p. 37 (under Dryopteris).

The above two varieties proposed by Dr. Domin are in all probability only growths of the common form.

OLEANDRA, Cav.

Sori round, inserted in a row near the base or below the centre of the compact free veinlets. Involucre reniform. A small genus, almost restricted to the tropics, distinguished from *Nephrodium* mainly by habit, with wide-creeping scandent shoots, jointed stems, and entire lanceolate-elliptical fronds.—*Hook.-Bak.*, Syn. Fil. 302.

O. neriformis, *Cav.*; *Domin,* Prodr. p. 60. Shoots woody, suberect, clothed with adpressed scales; stipes ½-1 in. long, with the joint below the middle. Frond 6-18 in. long, ¾-1½ in. broad, scattered, or in opposite pairs, or often in terminal whorls, narrowed gradually towards both ends; texture generally subcoriaceous and both sides naked; sori in two rather irregular rows near the midrib; involucre oblique.—*Hook-Bak.*, Syn. Fil. 302. *Maid. et Betche,* Proc. Linn. Soc. N.S.W. xxxiv. (1909) 368.

Hab.: Herberton, *R. F. Waller.* Found in Northern India, Malayan region, Polynesia, West Africa, and South America.

POLYPODIUM, Linn.

P. Danesianum, *Domin,* Prodr. p. 51 (under Dryopteris). Stipes tall, slender, subsulcate, perfectly glabrous and smooth, 14 in. high. Frond triphyllous, pinnæ simple, somewhat rigidly chartaceous, glabrous on both sides, above rather shining and of a dark green, paler beneath; lateral pinnæ broadly lanceolate oblong, base rotundate, apex obtuse, shortly petiolate, about 5 in. long and about $1\frac{1}{4}$ in. broad, crenate-dentate, teeth subacute; terminal pinnæ rather long, petiolate (petiole about 1 in. long), 6 in. long and about $1\frac{1}{2}$ in. broad, base cuneate. Costa glabrous, veins rather prominent, pinnate, venulæ 5-6 on either side of the veins, subarcuate, lowest venulæ free, the remainder anastomosing; sori small, numerous.

Hab.: Picnic Creek, *Dr. K. Domin.*

Very near *P. urophyllum,* Wall.

P. wurunuran, *Domin,* Prodr. p. 45 (under Dryopteris). This plant seems scarcely to differ enough from *P. aspidioides,* Bail., to rank as more than a form of that species.

P. accedens, *Blume*; *Domin,* Prodr. p. 174. Rhizome threadlike, very wide-creeping, scarcely scaly. Stipes very short. Frond dimorphous, the sterile ones oblong, obtuse, the fertile ones longer and narrower, 2-4 in. long, $\frac{1}{4}$-$\frac{1}{2}$ in. broad, the soriferous portion contracted; texture coriaceous; both sides naked; veins hidden, no distinct main veins, areolæ irregular, with free veinlets. Sori in single rows close to the midrib.—*Hook.-Bak.,* Syn. Fil. 353.

Hab.: Lake Eacham, *K. Domin.* A Malaysian and Polynesian species.

P. simplicissimum, *F. v. M.,* var **wurunuran,** *Domin,* Prodr. p. 175. This I have always included under the normal form.

P. nigrescens, *Blume,* var. **subsimplex,** *Domin,* Prodr. p. 176. Fronds shortly stipitate (stipites 1-$3\frac{1}{2}$ in. long, slender), usually all simple, lanceolate, long-acuminate, about $3\frac{3}{4}$-8 in. long; fertile ones about 1 in. broad, gradually narrowed into a stipes; sometimes a few trifid fronds occur,

Hab.: Bellenden-Ker, *K. Domin.*

P. Walleri, *Maid. et Betche,* Proc. Linn. Soc. N.S.W. xxxv. (1910) 799; *Domin,* Prodr. p. 170. A small tufted epiphytic fern, glabrous except the broad linear-lanceolate pale-brown scales at the base of the very short stipes. Fronds 1 to rarely 2 in. long, the largest somewhat above ½ in. broad, lanceolate in outline, cut down nearly to the rhachis into erecto-patent entire or indistinctly lobulate blunt lobes with slightly recurved margins, the lower shortened gradually into the undulately winged short stipes, the upper ones shortened into an undulately lobed blunt point. Veinlets simple or forked, concealed amidst the almost herbaceous texture. Sori orbicular, superficial or very slightly sunk into the tissue, comparatively large, 3 to 4 on the longest lobes, solitary on the short ones.

Hab.: Herberton District, *R. F. Waller.*

P. Luerssenianum, *Domin,* Prodr. p. 168. Very near *P. cucullatum,* Nees et Bl., forming small dense tufts. Fronds fasciculate, subcoriaceo-carnosulose, sessile or subsessile, about 1½ in. long and about 2 lines broad, scarcely attenuated towards the apex, base narrow-cuneate, deeply pinnatilobed; lobes numerous; sterile ones flat, linear or linear-oblong, very obtuse, quite entire; fertile ones in the upper part of the frond, slightly shorter, much broader, broadly obovate, rotundate obtuse, margin subcucullate. The whole plant quite glabrous.

Hab.: Bellenden-Ker, *K. Domin.*

P. cucullatum, *Nees et Bl.*; *Domin,* Prodr. p. 170. Stipites densely tufted, very short, naked. Frond 3-5 in. long, 2-3 lines broad, flaccid, pinnatifid throughout; lobes linear-oblong, blunt, entire, ½-¾ line broad, the fertile ones confined to the upper part, broader and with the edges upcurved so as to clasp the large solitary sorus; texture thick, subcoriaceous; rhachis naked or ciliated; both sides naked.—*Hook.-Bak.,* Syn. Fil. 324; *Maid. et Betche,* Proc. Linn. Soc. N.S.W. xxxv. (1910) p. 799.

Hab.: Herberton district, *R. F. Waller.*

P. spicatum, *Domin,* Prodr. p. 189 (under Cyclophorus). This seems only a growth of *P. confluens,* R. Br.

NOTHOLÆNA, R. Br.

N. sciadioides, *Domin* in sched. Cæspitose, but the fronds not numerous, loose, long-stipitate. Stipites slender, erect, subnitidous, quite glabrous, $3\frac{1}{2}$-$4\frac{1}{2}$in. long. Fronds (without the stipes) about 2-3 in. long and $1\frac{3}{4}$-$2\frac{3}{4}$ in. broad, deltoid subtripinnate. Rhachis very slender, the lower part fusco-castaneous, the upper part greenish ; pinnæ glabrous on both sides, all except the uppermost petiolulate. Lowest pinnæ about $1\frac{1}{2}$ in. long, ovate-deltoid, pinnate, apex pinnatifid, the outer basal pinnule about 6 lines long and pinnate or the apex lobed ; the medium pinnæ about 1 in. or less long. Sori paucisporangiate, few. The margins of the pinnules flat or obscurely subrevolute.—*Cheilanthes sciadioides,* Domin, Prodr. p. 135.

Hab. : Picnic Creek, Russell River, *K. Domin.*

The present plant, along with *N. fragilis,* Hook., *N. Prenticei,* Luers., and *N. glabra,* Brack., might all be included as forms of the oldest known species, *N. glabra,* Brack.

PLATYCERIUM, Desv.

P. alcicorne, *Gaud.*, var. **subrhomboideum,** *Domin,* Prodr. p. 198 (under *P. bifurcatum,* C. Christens.).

P. alcicorne, *Gaud.*, var. **lanciferum,** *Domin,* Prodr. p. 198 (under *P. bifurcatum,* C. Christens.).

P. grande, *J. Sm.*, var. **tamburinense,** *Domin,* Prodr. p. 200.

It is scarcely advisable to attach names to isolated plants of *Platycerium,* particularly as differences in their growth and form are so often caused by situation.

By Authority: Anthony James Cumming, Government Printer, Brisbane.

Queensland

Department of Agriculture and Stock, Brisbane

Botany Bulletin No. XVIII.

Contributions to the : Queensland Flora :

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1916

Prefatory Notice.

SINCE the issue of Botany Bulletin XIV. in October, 1896, to the present date only three others have been issued, and these almost entirely devoted to special subjects: No. XV. records a large number of additions to our Freshwater Algæ, No. XVI. mainly deals with the Fungi collected by Dr. Pritzel in Queensland in 1902, and No. XVII. with the additions to our ferns published by Dr. Domin in his "Prodromus einer Farnflora Queenslands." Nearly all additions to our Flora since the inception of the *Queensland Agricultural Journal* in July, 1897, have been recorded in its pages; it has, however, been considered that the "Contributions to the Flora of Queensland" were unsuitable for the Journal, and it has been decided to again issue Botany Bulletins as material becomes available. Records of fresh weeds which make their appearance and are likely to spread, and other matters of agricultural interest, will be continued to be published in the *Queensland Agricultural Journal*.

Contributions to the Queensland Flora.

Order DILLENIACEÆ.

TETRACERA, Linn.

T. Wuthiana, *F. v. M.* To the description in "Queensland Flora," p. 10, add:—Ripe carpels strigose-hirsute, about 3 lines long; seeds black, glossy, arillus yellow, fringed.

Hab.: Dunk Island, *E. J. Banfield*; Johnstone River, *Rev. N. Michael.*

Order GUTTIFERÆ.

GARCINIA, Linn.

G. Cherryi, *Bail.* To the description in "Queensland Flora," p. 103, add:—Sepals very coriaceous, as broad or broader than long, 2 lines diam.; petals coriaceous, broadly obovate, 5-6 lines long.

Hab.: Good flowering specimens have been collected in the Atherton district by *H. W. Mocatta* (received through the Director of Forests); at the time of writing the description in the "Queensland Flora" flowers in the bud stage only were available.

Order MALVACEÆ.

SIDA, Linn.

S. acuta, *Burm.* Fl. Ind. 147. Undershrub. Leaves nearly glabrous, 2-3 in. long, linear-lanceolate, acute, serrate, shortly petiolate; stipules subulate, longer than the petiole. Peduncles as long as the petiole, articulate in the middle. Calyx-tube subglobose, sepals triangular, acute. Petals yellow, twice the length of the sepals. Carpels 5-9, rugose, awned. Wight Ic. t. 95; *S. carpinifolia*, Linn. f. non Bourg., Hook. Fl. Brit. India I. 323.

Hab.: Croydon, *J. A. C. Wilson*; Townsville, *E. W. Bick*; Gordonvale, *E. Jarvis.*

A common weed of most tropical countries.

The nearest ally of this species is *S. rhombifolia*, Linn., from which it differs principally in the shorter peduncles and in the carpels being rugose and constantly awned.

Order STERCULIACEÆ.

RULINGIA, *R. Br.*

R. salvifolia, *Benth.* To the description in "Queensland Flora," p. 146, add :—Capsule about 3 lines diam., beset with subulate bristles, readily dehiscent.

Hab. : Springbrook (Macpherson Range), *C. T. White.*

Order RUTACEÆ.

CORREA, Sm.

C. Lawrenciana, *Hook.*, Journ. Bot. i. 254 ; *Benth.*, Fl. Austr. i. 355. A shrub, usually tall and rather slender, sometimes growing into a small tree ; branches more or less tomentose. Leaves petiolate, from ovate to oblong, obtuse, in some specimens $\frac{1}{2}$-1 in. long, in others 1-2 in. long or even more, flat, glabrous and often somewhat punctate above, tomentose beneath. Flowers 1-3 together, axillary or terminal, shortly pedicellate. Calyx tomentose, truncate with 4 small teeth. Petals tomentose outside, united the greater part of their length into a cylindrical corolla of $\frac{3}{4}$-1 in. long. Stamens exerted ; filaments all filiform from the base or equally and very slightly dilated. Cocci 4 lines long, slightly punctate and transversely veined. *C. ferruginea,* Backh. ; Hook. Ic. Pl. 3.

Hab. : Springbrook (Macpherson Range), *C. T. White.* Previously recorded from Tasmania, Victoria, and New South Wales.

MELICOPE, Forst.

M. Fareana, *F. v. M.* To the description in "Queensland Flora," p. 197, add :—Cocci about 3 lines long, nearly erect, the valves coriaceous and transversely wrinkled ; sepals and petals persistent, the latter extending beyond the cocci.

Hab. : Kairi (North Queensland), *E. W. Bick.*

Order CELASTRINEÆ.

SIPHONODON, Griff.

S. pendulum, *Bail.* To the description in "Queensland Flora," p. 262, add :—Flowers in lateral panicles shorter than the leaves. Calyx irregularly 5-partite, larger lobes 1 line long ; petals $2\frac{1}{2}$ lines long ; filaments very broad (almost as broad as long). Disk lobed.

Hab. : Stannary Hills, *Dr. T. L. Bancroft.*

Plate 1.

CERATOPETALUM APETALUM, VAR. MICROPHYLLUM, *n. var.*

Order SAPINDACEÆ.

NEPHELIUM, Linn.

N. semiglaucum, *F. v. M.*, **var. acutifolium,** *F. v. M.* (sub. Cupania), Fragm. ix. (1875), p. 98. Differs from the normal form in the leaves being more or less acute, generally longer, more lanceolate, and not always so prominently glaucous beneath.

This was not recorded in the "Queensland Flora"; however, a short time back specimens from the Queensland Herbarium, forwarded to Prof. L. Radlkofer, Munich, were determined by him as belonging here. On looking through our Sapindaceæ we have found a number of specimens of it collected in various localities in tropical Queensland. Dr. Radlkofer described it as a distinct species under the name *Guioa acutifolia* [in Sitzb. Math. Phys. Acad. Muench. ix. (1879) 608]; but, following the classification and nomenclature adopted in the "Queensland Flora" and "Comprehensive Catalogue of Queensland Plants," we place the plant as here given. It extends to New Guinea and Malaya.

Order SAXIFRAGEÆ.

CERATOPETALUM, Sm.

C. apetalum, *D. Don,* **var. microphyllum,** *n. var.* (Plate 1). A large tree, glabrous; branchlets angular. Leaves 1-foliolate. Leaflet coriaceous articulate on a petiole of 2-3 lines, lanceolate or ovate-lanceolate, obtuse or obtusely acuminate, bluntly serrulate, strongly reticulate, $\frac{3}{4}$-$1\frac{3}{4}$ in. long, 5-8 lines broad. Flowers in corymbose cymes or panicles, terminal or in the upper axils. Calyx-lobes (only seen in fruit) about $\frac{1}{4}$ in. long. purplish, strongly coriaceous. Petals absent. Fruit without the wings about 2 lines diameter, the adnate calyx-tube smooth not ribbed; when crushed the fruits give off a powerful odour of Coumarin characteristic of the species.

Hab.: Springbrook (Macpherson Range), *C. T. White.*

This new variety differs from the normal form in its much smaller leaflets on shorter petioles, the leaves except for their unifoliolate character resemble very closely those of *C. gummiferum.* The normal form is common in New South Wales

Plate 2.

LEPTOSPERMUM FLAVESCENS, VAR CITRATUM, *n. var.*

extending to near the Queensland border, and is known locally as Coachwood on account of the suitability of the timber for coach-building purposes.

The above full description is given as the typical species has not yet been recorded from Queensland.

Order MYRTACEÆ.

LEPTOSPERMUM, Forst.

L. flavescens, *Sm.,* **var. citratum,** *Bail. f. & White,* Ql. Agric. Jl. vol. 5, n.s., p. 161 (Plate 2). Differs from the normal form in the leaves possessing a very pleasant citron odour.

Hab.: Abundant at Springbrook (Macpherson Range), *C. T. White.*

The plant forms a compact bushy shrub or small tree about 20 ft. high, with a light-brown fibrous bark; the citron scent is powerful and may prove of considerable commercial value, and the plants are worthy of cultivation for this purpose.

L. Liversidgei, *Baker & Smith,* Journ. & Proc. Roy. Soc. N.S.W. vol. 29 (1905), p. 124 (Plate 3). *L. flavescens,* Sm., *var. citriodorum,* Bail. Queens. Agric. Journ. vol. 15 (1905), p. 781.

Hab.: Coastal swamps of Southern Queensland.

This plant was first referred to by F. M. Bailey as a variety of *L. flavescens,* and placed by him in the "Queensland Flora" as a form of the variety *obovatum*; later on he described it as a new variety under the name of *citriodorum*; a few months later Baker & Smith described a new citron-scented *Leptospermum* from New South Wales as *L. Liversidgei.* There seems little doubt of the identity of their plant with that previously described as *L. f. var. citriodorum.* This differs considerably from the common forms of *L. flavescens,* and as a citron-scented variety has now been found presenting no essential differences from the typical species we think it better that the two plants should be placed as here given. The accompanying plates should aid in their recognition.

RHODAMNIA, Jack.

R. trinervia, *Blume,* **var. glabra,** *Maid. & Betche,* Proc. Linn. Soc. N.S.W. vol. 24 (1899), p. 146. Quite glabrous.

LEPTOSPERMUM LIVERSIDGEI, *Baker & Smith.*

The two lateral nerves much less prominent than in the typical form and closer to the margin forming an intramarginal vein.

Hab. : Springbrook (Macpherson Range), *C. T. White.* A very common shrub.

This variety presents a very different appearance from the normal form. It was first collected in the Northern Rivers District of New South Wales.

EUGENIA, Linn.

E. parvifolia, *C. Moore*, Journ. & Proc. Roy. Soc. N.S.W. vol. 27 (1893). p. 85. A large tree but flowering as a tall compact bushy shrub ; quite glabrous. Leaves ovate-lanceolate, 1-1½ in. long, tapering to a long but obtuse point. Flowers white, small in short racemes, terminal or more rarely in the upper axils, generally in pairs on the slender pedicels ; calyx-lobes and petals 5, the calyx much attenuated towards the base. Fruit red, pyriform, but flat at the top almost turbinate, about ½ in. long ; one-seeded.

Hab. : Kin Kin (North Coast line), *W. D. Francis* ; Fraser Island, *W. R. Petrie.*

(The species was first collected on the Richmond River in Northern N.S.W.)

The specimens forwarded by Mr. Francis were good flowering ones and agree well with the description and those from New South Wales. Those from Fraser Island bore only a few rather poor fruits, but seem to belong here.

E. cyanocarpa, *F. v. M.*, Fragm. ix., p. 146 (1875). A small tree flowering as a shrub, quite glabrous. Leaves lanceolate, acuminate, narrowed at the base, 2-5½ in. long. Flowers in trichotomous pedunculate cymes, either terminal or opposite at the base of new shoots ; peduncle branches and pedicels slender ; calyx broadly urceolate, nearly 2 lines long, lobes 4, short. Stamens numerous with slender, filaments. Style slender, about ½ in. long. Fruit globular, 5-6 lines diam., purplish-blue when ripe.

Hab. : Rockingham Bay, *Dallachy* ; Kin Kin (North Coast line), *Francis & White* ; Mooloolah River (*Tryon & White*) ; Springbrook (Macpherson Range), *C. T. White.*

Plate 4.

MARSDENIA FRASERI, *Benth.*

The nearest ally of *E. cyanocarpa* among Queensland species is *E. oleosa*, F. v. M., from which it principally differs in the broadly urceolate calyx and globular fruit. We have a specimen in the Queensland Herbarium from Rockingham Bay and labelled *E. oleosa, var. cyanocarpa*, by Mueller. Maiden and Betche [Proc. Linn. Soc. N.S.W. vol. 29 (1904), pp. 740-2] record this species from several localities in Northern New South Wales.

Order ASCLEPIADEÆ.

TYLOPHORA, R. Br.

T. floribunda, *Benth.* To the description in "Queensland Flora," p. 1006, add :—Follicles 3-angled, somewhat boat-shaped, acuminate, 4-5 in. long.

Hab.: Kin Kin (North Coast line), *Francis & White*; Atherton District, *E. W. Bick.*

MARSDENIA, R. Br.

M. Fraseri, *Benth.* (Plate 4.) To the description in "Queensland Flora," p. 1009, add :—Follicles almost orbicular or broader than long, about $1\frac{1}{2}$ in. diam.

Hab.: Lake Cootharaba, *Keys & Wedd*; Noosa, *H. A. Longman.* Fairly common in Moreton Bay, where fruiting specimens have several times been recently gathered by different collectors.

Order LAURINEÆ.

ENDIANDRA, R. Br.

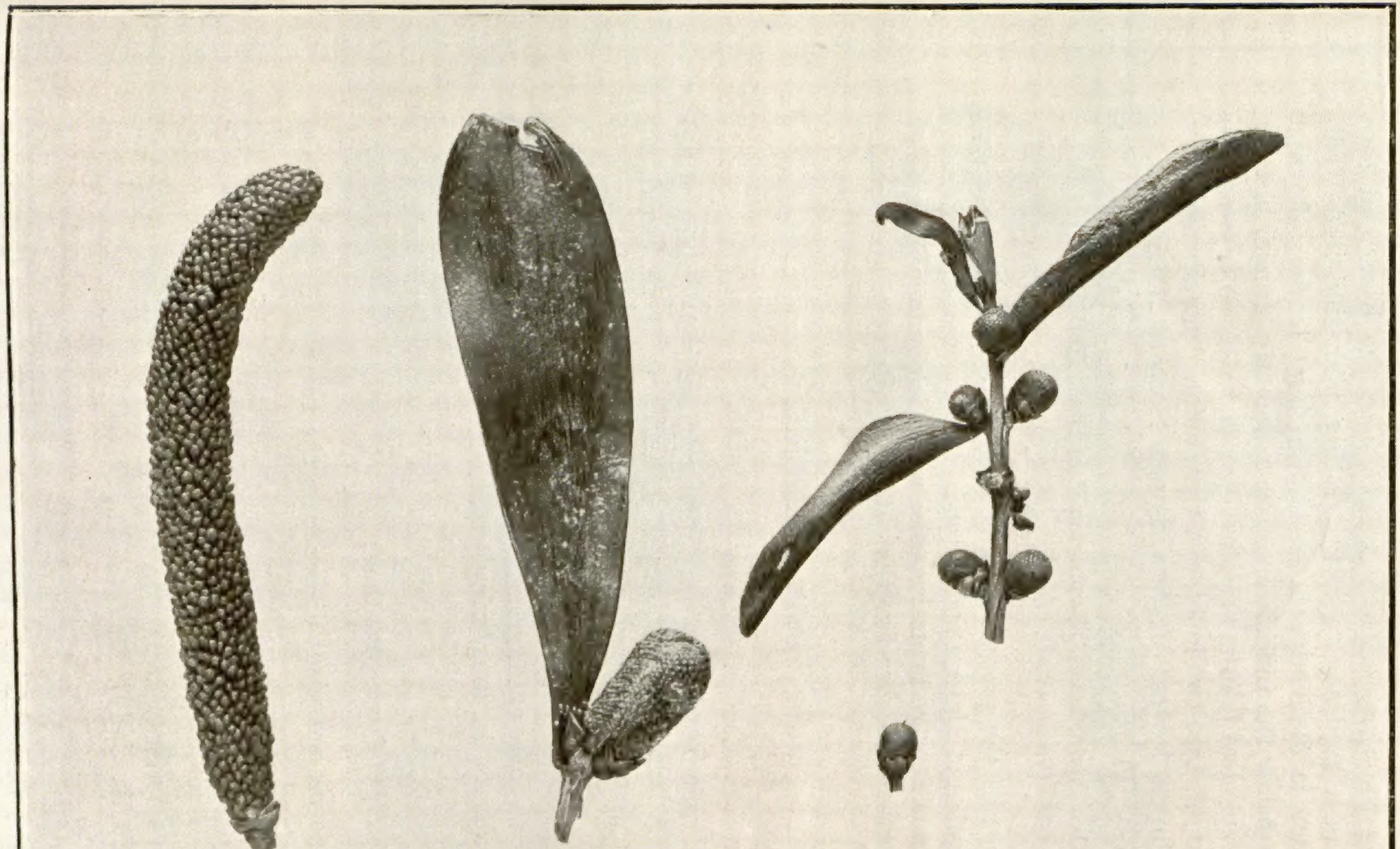
E. Lowiana, *Bail.* To the description in "Queensland "Flora," p. 1307, add :—Panicles axillary, numerous. Flowers small, perianth-tube thick, lobes short. Stamens, the 3 inner ones alone perfect, alternating with 3 staminodia.

Hab.: Kin Kin (North Coast line), *Francis & White.*

Order PROTEACEÆ.

EMBOTHRIUM, Forst.

E. Wickhami, *F. v. M.*, **var. pinnata,** *Maid. & Betche*, Proc. Linn. Soc. N.S.W. xxxv. (1910), p. 795. Leaves including the slender petiole 9-18 in. long, pinnate with 7-9 leaflets; leaflets lanceolate, generally 4-5 in. long and $\frac{3}{4}$ in. broad in the middle, tapering at both ends, pinnately obliquely veined, only the



AGATHIS ROBUSTA, *C. Moore*; A. PALMERSTONI, *F. v. M.*; A. MICROSTACHYA, *n. sp.*

Plate 5.

principal veins conspicuous. The rhachis between the leaflets in most leaves is slightly winged towards the top, frequently uniting the three uppermost leaflets at the base, and thus showing a tendency to relapse into a pinnatifid leaf. This tendency is distinctly shown in the floral leaves; the first leaves below the inflorescence are frequently simple, next to the simple leaf follows occasionally a leaf cleft to or nearly to the rhachis into two lobes, and then follow generally abruptly the pinnate leaves. *Maiden*, Forest Flora of N.S.W. vol. 5, pp. 91-93, Pl. 167.

Hab.: Springbrook (Macpherson Range), *C. T. White.*

This variety was first collected in the Dorrigo, New South Wales, and the present specimens agree well with the above description of Maiden and Betche. It presents a very different appearance to the typical species which is common in some of our northern scrubs; like that, it forms a large timber-tree.

Order CONIFERÆ.

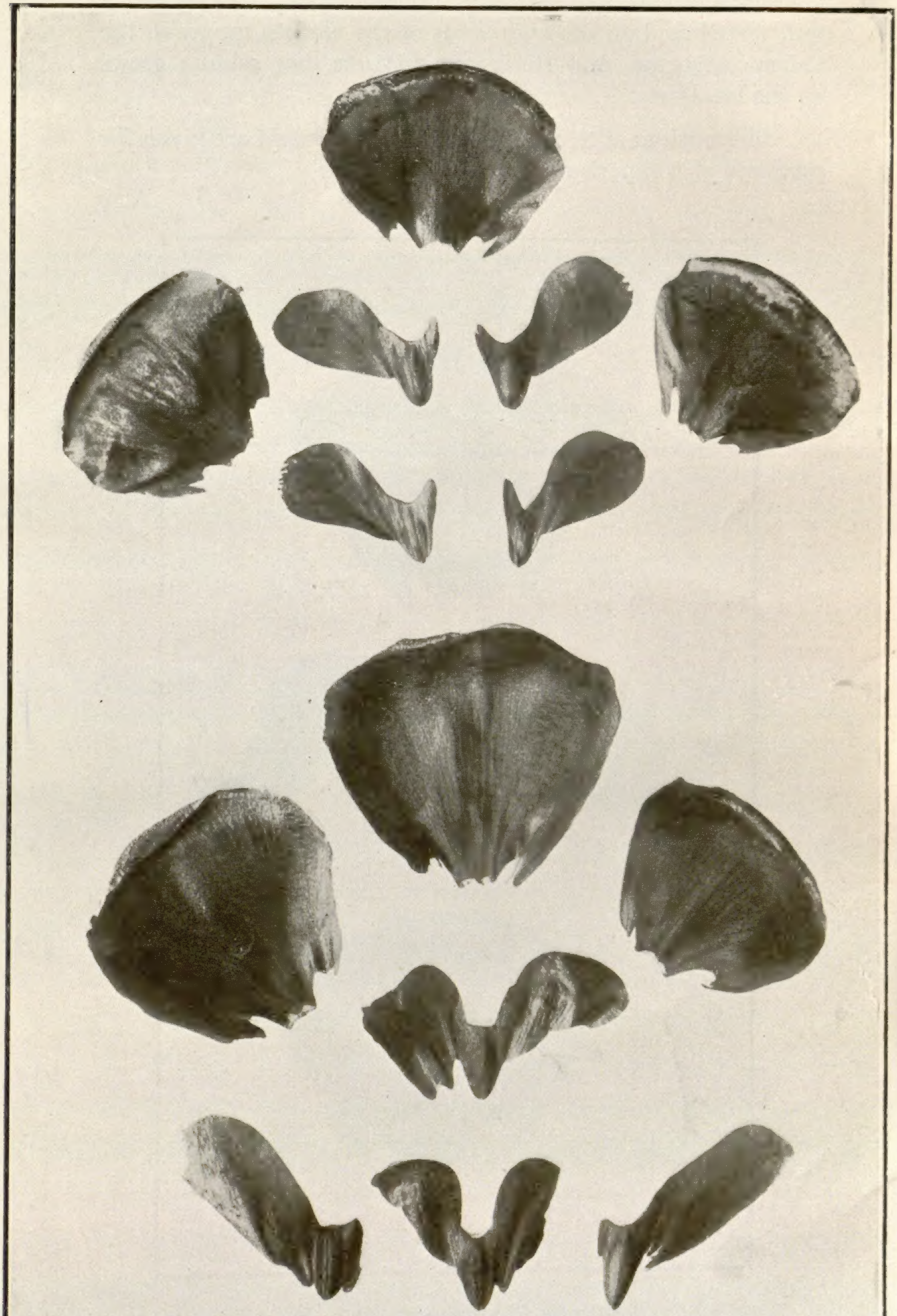
AGATHIS, Salisb.

A. microstachya, *n. sp.* (Plates 5 and 6.) Black Kauri Pine. A large tree. Leaves $1\frac{1}{2}$-2 in. long, $\frac{1}{2}$ in. broad, not very coriaceous, tapering into a very short petiole, usually oblique. Male amenta small, nearly globular, 2-3 lines long, sessile or shortly pedunculate. Fruit-cones and scales similar to those of *A. robusta.* Seeds deeply emarginate at the apex, about $\frac{1}{2}$ in. long, wing $\frac{3}{4}$ in. long.

Hab.: High lands of ranges in the Cairns, Atherton, and Herberton districts, *H. W. Mocatta*, District Forest Inspector. (Received through the Director of Forests, Brisbane.)

The present plant differs from the two previously known Queensland species, *A. robusta*, C. Moore, and *A. Palmerstoni*, F. v. M., in its smaller leaves, very small male amenta, and deeply emarginate seeds.

In a letter addressed to the Director of Forests, Brisbane (Mr. N. W. Jolly), Mr. Mocatta states: "Black Kauri Pine grows to a large tree equal to *A. Palmerstoni.* There is very little difference in general appearance of growth. In its sapling stage the Black Kauri shows a smooth bark with large black patches, but in its more mature state the bark becomes very rough and scaly from root to branches. When scales fall or

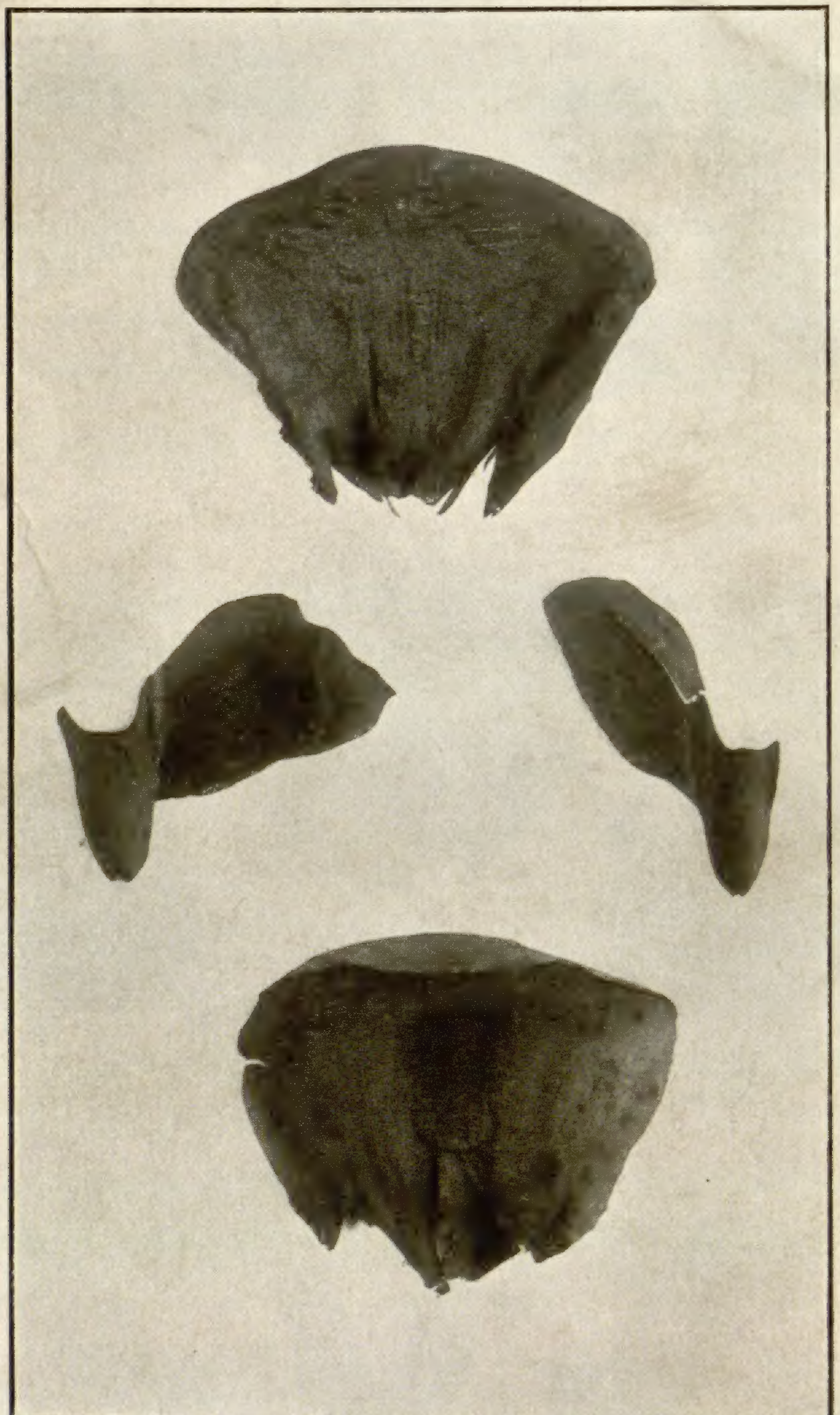


AGATHIS MICROSTACHYA, *n. sp.*
AGATHIS ROBUSTA, *C. Moore.*

are pulled off, the first skin shows bluish black. The species is well distributed on the high lands of the various ranges in the Cairns, Atherton, and Herberton districts, but seldom grows on the low lands."

Illustrations of *A. robusta* and *A. Palmerstoni* are given for purposes of comparison.

Plate 7.



AGATHIS PALMERSTONI, *F. v. M.*

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